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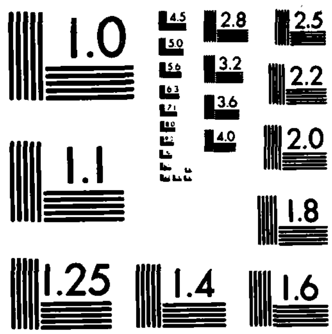
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Report No. CG-D-22-83

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PREDICTION OF THE SWAMPING TENDENCIES OF RECREATIONAL BOATS

MARCH 1983

FINAL REPORT

Prepared for:

U.S. Department of Transportation
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16. Abstract

Seven small recreational boats were tested to obtain heave, pitch and relative transom motion RAO curves in regular longitudinal waves. This data was needed to determine the feasibility of making mathematical simulations of swamping tendencies using linear strip theory, and, in a few cases, a 3-D motion theory. The probability of swamping of the boats was calculated for seven sample severe wave conditions. The boats included two jonboats, a dinghy, runabout, skiff dory and a half-scale model of a jonboat, all in a number of asymetric loading conditions. The motions were found to be linear. The strip theory was found to be unsuitable for the boats. The probability of swamping was found to be high indeed. The 3-D theory yielded promising results, but more research is needed to establish its suitability for the boats.

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PREFACE

This report summarizes work conducted under Contract No. DOT-CG-954-284-A by CASDE Corporation under the auspices of the U.S.Coast Guard with Mr. J. White serving as the Office of Research and Development's technical representative for the work performed herein. The program manager was Dr. R. Saucedo. Dr. B.W.Oppenheim was the principal investigator.

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The authors are grateful to Mr. Larry D. Brown for help throughout the project in computations and plotting.

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The next 62 figures present comparisons between the measured and theoretically-predicted motions, as defined in the following table:

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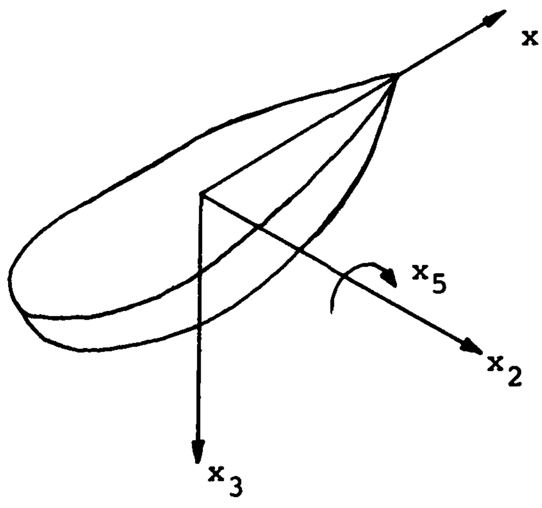
NOMENCLATURE

$[a_{ij}]$	= added mass matrix
$[b_{ij}]$	= damping coefficient matrix
B	= maximum beam of wetted underbody
BOA	= beam overall
$[c_{ij}]$	= matrix of hydrostatic restoring force coefficients
$d_1^o(t)$, $d_2^o(t)$	= distances defined in Fig. 77.
d_1^o, d_2^o	= initial values of $d_1^o(t)$ and $d_2^o(t)$ respectively
D	= distance between the potentiometers in Fig.77
ENOS	= expected number of swampings per hour
f	= frequency in Hz
F	= freeboard at a boat end
F_i	= exciting force due to incident waves
F_{Di}	= exciting force due to diffracted waves
g	= gravitational acceleration
h(t)	= heave motion record
HP	= horsepower
H	= RAO of relative transom motion (see RAO)
I	= boat moment of inertia in pitch motion
k	= wave number
L	= wetted length
LCG	= longitudinal center of gravity (forward of stern)
LOA	= length overall
m	= boat mass
m_o	= zero-th moment of spectrum
m_2	= second moment of spectrum
MST	= motion sensor transducer

$p_1(t)$, $p_2(t)$	=	lengths of strings defined in Fig. 77
RAO	=	Response Amplitude Operator, defined as: (double amplitude motion)/wave height, for heave (double amplitude motion)/wave height, for transom motion (single amplitude motion)/wave slope, for pitch motion
r	=	transom motion RAO computed from heave and pitch RAO's
s(t)	=	surge motion record
$S_T(f)$	=	transom motion spectrum ordinate
$S_w(f)$	=	wave spectrum ordinate
t	=	time
$w(t)$, w_o	=	height above the potentiometers, defined in Fig. 77
$\bar{x}$	=	distance from the center of gravity to boat transom
x_3, x_5	=	heave and pitch motions, respectively
$\dot{x}_3$, $\dot{x}_5$	=	heave and pitch velocities, respectively
$\ddot{x}_3$, $\ddot{x}_5$	=	heave and pitch accelerations, respectively
ϵ_3, ϵ_5	=	heave and pitch phase angles, respectively, (lag)
λ	=	wave length
ω	=	wave circular frequency



DEFINITION OF MOTIONS

EXECUTIVE SUMMARY

Seven small recreational boats were tested at the Offshore Technology Corporation tank to obtain data necessary for determining whether a mathematical simulation of swamping motions is feasible, and for performing an analysis of the probability of swamping. The RAO (response amplitude operator) curves for the heave, pitch and relative transom motion in head and stern regular waves were measured. Emphasis was placed on obtaining curves that were very accurate.

The boats included those which have been determined to be involved in many swamping accidents, namely two jonboats, a dinghy, a runabout, a skiff, a dory, and a half-scale model of one of the jonboats. The latter was included to study the size effect, should nonlinearities turn out to be significant.

Tests were made with two wave heights in order to detect any nonlinearity in the motion due to wave height. With one exception, all motions turned out to be reasonably linear and in the case where they were not, the assumption of linearity would result in a conservative estimate of the motions.

All tests were conducted at zero speed with the loads simulating typical payloads up to the limits allowed by the present Level Floatation regulation. A total of eighteen different load and boat combinations were studied. The distributions of the payloads were such as to loosely simulate the circumstances in which swamping accidents occur, i.e., with the loads concentrated in ends of the boats, and with the waves approaching from the low ends of the boats.

The results of the tests of the half-scale model are unusable because purely one-dimensional waves of low amplitude could not be produced in the tank.

A review of the theoretical methods available for predicting the motions is presented. The linear strip-theory program HANSEL was chosen for the feasibilty analysis, despite the obvious deficiencies of this theory in non-slender hull applications. This decision was made partly for economic and partly for technical reasons. The alternative theoretical tools are an order of magnitude more involved in terms of the computing time and they are deficient in several technical aspects too.

The HANSEL program was modified to handle boat shapes, and a pre-processor to it was written to compute the boat offsets in a standard format for the loaded underbody. Another modification provides motion output data at a given point on the boat, such as the transom, in addition to the

center of gravity.

The HANSEL predictions of the RAO curves vary considerably in quality, without apparent trend. Although many predictions were excellent, enough were so poor that little trust can be placed in the linear strip-theory for these applications.

A set of motion predictions was made for a loading condition with a program named HYDRO3 which is based on a 3-D source distribution. In principle, such a theory should be better suited for the recreational boats. The results obtained indicate some improvement over the results obtained from HANSEL, but valid questions still remain and it is impossible to conclude that this theory would be sufficiently accurate for all cases, without performing more extensive comparisons. They were not included here because of economic limitations.

A probabilistic analysis of swamping tendencies was performed for all boats and loading conditions, in seven sample irregular wave conditions. The wave spectra used represented rather more severe conditions than might be considered typical for waters with small-boat activities, however little choice was available since such spectra are scarce. Also, the conditions could occur on large lakes and in bays. The results make it evident that small corrections to the freeboard would not make the boats truly safe in waves if certain extreme load distributions were to be tolerated. These preliminary results indicate that the boats may not be suitable for operations in any kind of significant wave conditions. In order to make the boats truly safe in waves, without changing the present Level Floatation regulation, the freeboard would need to be increased by close to 100 %, and often even more.

The swamping analysis was performed based on both the theoretically-predicted and measured RAO curves. These results confirmed again that the strip theory is not suitable for the present applications.

1.0 INTRODUCTION

In the early 1970s recognition of a continuing high level of fatal recreational boating accidents prompted the initiation of a U.S. Coast Guard program to seek more effective boating safety regulations. The first significant effort resulted in the Cause Identification Study published in 1975, [21], which identified the seven leading fatal boat/accident type combinations. These are as follows:

Table 1. Accident Cause Identification

Boat Type	Accident Type	% of Fatal Loading-Related Accidents
Lightweight Boat	Capsizing	20.7
Lightweight Boat	Swamping	15.7
Canoe	Capsizing	10.0
Runabout	Swamping	9.2
Runabout	Falls Overboard	8.8
Lightweight Boat	Falls Overboard	6.1
Runabout	Capsizing	4.2

The swamping accidents have been identified to occur often in longitudinal waves due to the water coming over the boat transom, either at the bow or stern, caused by insufficient boat freeboard, excessive trim and excessive motions in waves.

The Cause Identification Study also developed typical scenarios for the various boat/accident type combinations. Subsequently, a plan was developed to study specific accident mechanisms to provide a basis for deriving accident prevention measures, possibly including a new safeloading regulation.

The regulation in force at present, called "Level-Floatation Regulation" requires that boats under 20 feet in length float approximately level when loaded with people and filled with water. The regulation has been shown to be effective in reducing the number of small-boat accidents, however it is concerned strictly with static behavior of the boats. The large number of accidents in waves gave rise to a concern about the dynamic behavior of the boats.

The U.S.Coast Guard plan called for a study of feasibility of both mathematical simulations and tank modeling of the typical accident scenarios. Two studies were conducted in 1975 to determine the feasibility, [18] and [7] respectively. They covered measurements of the response amplitude operators of boat motions in wave tanks, predictions of the operators by linear theories and time-

domain simulations of nonlinear motions. In each study the results of the application of the respective method were compared with previously conducted full scale tests of typical boats. On the basis of these comparisons it was concluded that neither method was feasible.

In October 1979, the U.S. Coast Guard contracted with CASDE Corporation to complete certain unfinished tasks and to assess the status of the entire program. This work, [10], determined that the conclusions of the feasibility studies of tank testing and mathematical modeling ,[18] and [7], had to be disregarded because the boat motion data, which were the basis for the study, may have been in serious error. Specifically, the full scale tests did not measure steady-state motions but rather random motions in a seaway, and the wave probe used for the tests may have been systematically in error. Similiar troubles with the wave probe negated later tank tests of the boat motions, [1].

This determination opened again the question of the feasibility of mathematical modeling and tank testing. The U.S. Coast Guard extended its contract with CASDE to accomplish this work. The task was named Phase IIIa, Prediction of the Swamping Tendencies of Recreational Boats by Means of Tank Tests and Computer Studies.

It should be noted that in the evolution of the recreational boat safe loading program the emphasis has gradually shifted to just two of the seven leading fatal boat/accident combinations - swamping of lightweight boats and runabouts. The present work concentrates exclusively on the swampings, since swamping accidents seem to be more susceptible to reduction by regulation. There is little, if any, work being done at the present time on the other five combinations.

Throughout this report, the swamping is defined as an occurance of an event such that the instantaneous boat freeboard in longitudinal waves, at either boat end, becomes zero, i.e., of the water flowing or about to flow into the boat. Essentially, a swamping is a bow or transom immersion. The load in the boat is static, rigidely attached to the boat. The waves are longitudinal, either from bow or stern.

The present report is organized into three parts. The first presents measurements of vertical motions of six typical recreational boats in longitudinal waves. The motions include heave, pitch and the relative motion of the freeboard at the boat low end. The boats are loaded as permitted under the present Level-Floatation regulation simulating a range of loading conditions that varied from extreme boat-end load to even keel. The motions are defined in terms of the motion response amplitude operators (RAO's). The tests are performed in full-scale, at two

extreme wave heights to permit an evaluation of the importance of the motion nonlinearity. The conclusion of this part is that the motions are indeed quite linear.

The second part of the report presents comparisons between the measured RAO's and those predicted theoretically. An evaluation of the available theoretical methods for predicting the motions is given.

The third part presents predictions of the probability of swampings in seven sample conditions of irregular waves. All these conditions represent rather severe waves for small boats. The predictions are based on both the actual and theoretically-computed RAO's. It is concluded that the theoretical predictions are too inaccurate to be applicable to a general class of recreational boats. A prediction is also made of the boat freeboard increase necessary to assure some low probability of swamping. The range of the freeboard increase studied was from 0 to 8 inches. Without exception, all boats needed over 8 inches of the increase of freeboard.

The last two parts present a summary, conclusions and recommendations.

2.0 TANK TESTING OF SEVEN RECREATIONAL BOATS

In order to evaluate the feasibility of analytical modeling the motions it is essential to have a well-defined sample of the motion curves for comparisons with theory. Such a data base was not available at the commencement of this project. The information that was available was suspect with regard to its accuracy. (For example, the U.S. Coast Guard Research and Development Center had conducted wave tank tests of a jonboat and a runabout to produce RAO curves but for the reasons outlined in [10], the results are unreliable). Therefore the first objective is to obtain well defined RAO curves of the motions of a representative sample of typical small recreational boats.

2.1 DESCRIPTION OF TEST BOATS

Seven boats were tested in total of 18 loading conditions. Two boats are stock aluminum jonboats which are typical of the types most frequently involved in fatal swamping accidents. They are 13.5 and 14 feet in length, respectively. The third boat is an 8-foot aluminum dinghy. The three boats were selected since their length to beam ratios form a rather systematic series. The fourth "boat" tested is a half-scale model of the first which was intended to define the effect of a pure size difference, should some nonlinear effects turn out to be significant. The fifth boat is a 12.125-foot skiff. It is similiar to jonboats but it has a full pointed bow rather than rectangular waterlines. The sixth boat is a classical New England dory. It is 15.833-ft long, having long pointed overhangs and high flares. The last boat is a very popular tri-hull runabout 15.3-ft. long.

Table 2 lists the principal characteristics of the boats. Figures 1 to 6 illustrate the full offsets of the boats and the accompanying tables list the numerical values of the offsets.

Table 2. Boat Characteristics

BOAT	LENGTH (LOA) feet	BEAM (BOA) feet	(LOA/ BOA)	LIGHT WEIGHT lbs	MAXIMUM WEIGHT lbs	PERSONS CAPACITY	MAX HP
13.5'JONBOAT	13.50	3.75	3.60	80.0	425	2	7
8' DINGHY	8.00	4.04	1.98	90.8	400	3	4
14' JONBOAT	14.00	4.67	3.00	139.	655	3	20
12.1'SKIFF	12.12	4.27	2.84	54.0	629	3	10
15.8 DORY	15.83	4.00	3.96	155.	496	2	0
15.3'RUNABOUT	15.33	5.65	2.72	597	1657	5	70

Light Weight = weight of the boat "as purchased" with no motor.
Maximum Weight= maximum total weight permitted by the USCG based on the Level Floatation regulation.

2.2 DESCRIPTION OF TEST SERIES

The swamping accident scenarios point to a much higher likelyhood of accidents when the boats are heavily loaded at one end, then when the load is distributed longitudinally. This is not surprising since the freeboard, which is not large even when the boats float at an even keel, is then reduced to only a few inches. A typical scenario may indicate one or more persons sitting at the very end of a boat and trying to fix the motor or fighting an anchor line. Therefore strongly asymetrical loads were included in the series. However, no specific accident scenarios were followed.

The total weight of the payload is fixed by the Level Floatation regulation and is manifested by the weight and persons capacity displayed on the Coast Guard plate attached to the boats. It should be noted that the regulation leaves complete freedom on the distribution of the load in the boat. The loading conditions were selected to study extreme variations in trim and draft. Normally, the weight of maximum person capacity (plus motor and gear, where applicable) was placed at the stern thwart. If this were not possible because of volumetric limitations, one or more person's weight was placed on the thwart amidships. This would constitute one load condition. Another one or two conditions were obtained by removing one or two persons from the heavy boat end. The last condition was obtained by placing the weight at the other boat end. The 13.5-ft. jonboat which was most typical of a type most frequently involved in fatal swamping accidents was tested more thoroughly in both head and following seas, than the other boats.

The entire test series were performed during three distinct time periods.* The tests of the 8 ft. jonboat were performed at two separate times. Because of limited time at the test tank, the tests of the 8 ft. jonboat were not completed during the first test period and they were resumed during the next test period. Although it was intended to keep the boat loading and other parameters the same in both test periods, some small differences occured and therefore the two tests are treated as separate loading conditions.

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*) The original project plan called for testing the 13.5-ft jonboat, its half-scale and the 8-ft. dinghy first, then for making comparisons of the results with the theory, followed by making modifications to the theory to improve the quality of the theoretical predictions, if possible and practical, and finally for testing the remaining boats, thus verifying the modified theory. However, since no theory modifications were made (as is discussed in Section 3.5 of this report), all test results are reported as if they were performed in a single series.

The half-scale model was loaded with weights appropriately scaled to the weights of the prototype. However, because the empty model hull was slightly heavier than it should have been, some of the interior weights at the center of gravity were correspondingly reduced so that the total weight was correctly scaled, but this introduced some discrepancy in the moment of inertia.

The test series 1200 represents a boat floating at even keel. This is the only condition tested of this type. It was included in order to evaluate the motions and swampings in a potentially safest loading condition.

Because the 8 ft. jonboat has a maximum persons capacity of two and a maximum weight capacity of 300 pounds, the weight of the simulated persons used in test series 1100 and 1200 was 150 pounds each.

A summary of the load conditions for each test series is given in Table 3.

Table 3. Summary of Load Conditions

TEST SERIES	BOAT TYPE	BOAT LOA ft	LOA/BOA	LOADING CONDITION	DISPL. lbs	I lb*ft2	LCG ft	LWL/BWL	TRIM deg.	WAVE DIR. from	WAVE HGHT ft	LOW FREEB ft
100	JON	13.5	3.60	1 Man Aft	342.45	4326	10.49	2.92	-3.1	Stern	1.5	0.82
200	JON	13.5	3.60	1 Man Aft	342.45	4326	10.49	2.92	-3.1	Stern	6.0	0.82
300	JON	13.5	3.60	2 Men Aft	507.45	4414	10.77	2.47	-5.3	Stern	1.5	0.54
400	JON	13.5	3.60	2 Men Aft	507.45	4414	10.77	2.47	-5.3	Stern	5.0	0.54
500	JON	13.5	3.60	1Aft/1Mid	507.45	7727	8.69	3.90	-1.3	Stern	1.5	0.88
600	JON	13.5	3.60	1Aft/1Mid	507.45	7727	8.69	3.90	-1.3	Stern	6.0	0.88
700	JON	13.5	3.60	2 Men Fwd	507.45	13280	3.99	3.09	5.1	Head	1.5	0.45
800	JON	13.5	3.60	2 men Fwd	507.45	13280	3.99	3.09	5.1	Head	3.0	0.45
900	JON	6.75	3.60	1 Man Aft	48.96	186.8	4.68	3.72	-1.8	Stern	0.75	0.40
1000	JON	6.75	3.60	1 Man Aft	48.96	186.8	4.68	3.72	-1.8	Stern	1.5	0.40
1100	DINGH	8.00	1.98	1 Man Aft	342.70	1479	5.93	1.50	-6.1	Stern	1.5	0.73
1300	DINGH	8.00	1.98	1 Man Aft	336.65	1515	5.95	1.48	-6.1	Stern	1.5	0.74
1400	DINGH	8.00	1.98	1 Man Aft	336.65	1515	5.95	1.48	-6.1	Stern	3.0	0.74
1500	DINGH	8.00	1.98	Even Keel	428.40	2651	4.89	1.87	-0.8	Head	1.5	0.96
1600	DINGH	8.00	1.98	Even Keel	428.40	2651	4.89	1.87	-0.8	Head	3.0	0.96
1700	JON	14.0	3.00	2Aft/1Mid	784.50	8851	9.90	2.69	-3.1	Stern	1.5	0.64
1800	JON	14.0	3.00	2Aft/1Mid	784.50	8851	9.90	2.69	-3.1	Stern	3.0	0.64
1900	JON	14.0	3.00	2Fwd/1Mid	794.00	17583	8.97	3.02	4.42	Head	1.5	0.38
1950	JON	14.0	3.00	2Fwd/1Mid	794.00	17583	8.97	3.02	4.42	Head	3.0	0.38
2000	RUNAB	15.3	2.72	3Aft/2Mid	1657.2	23313	10.4	2.56	-2.3	Stern	2.0	0.62
2050	RUNAB	15.3	2.72	3Aft/2Mid	1657.2	23313	10.4	2.56	-2.3	Stern	6.0	0.62
2100	RUNAB	15.3	2.72	3 Aft	1327.2	20565	11.0	2.46	-.64	Stern	2.0	0.60
2150	RUNAB	15.3	2.72	3 Aft	1327.2	20565	11.0	2.46	-.64	Stern	6.0	0.60
2200	RUNAB	15.3	2.72	2Fwd/2Mid	1492.2	26341	7.65	2.82	1.53	Head	2.0	0.47
2250	RUNAB	15.3	2.72	2Fwd/2Mid	1492.2	26341	7.65	2.82	1.53	Head	6.0	0.47
2300	SKIFF	12.1	2.84	2Aft/1Mid	628.75	5645	9.36	2.39	-1.9	Stern	2.0	0.53
2350	SKIFF	12.1	2.84	2Aft/1Mid	628.75	5645	9.36	2.39	-1.9	Stern	6.0	0.53
2400	SKIFF	12.1	2.84	1Aft/1Mid	463.75	5139	8.84	2.63	-1.3	Stern	2.0	0.81
2450	SKIFF	12.1	2.84	1Aft/1Mid	463.75	5139	8.84	2.63	-1.3	Stern	4.0	0.81
2500	SKIFF	12.1	2.84	2Fwd/1Mid	625.50	6730	5.28	2.75	4.25	Head	2.0	1.00
2550	SKIFF	12.1	2.84	2Fwd/1Mid	625.50	6730	5.28	2.75	4.25	Head	6.0	1.00
2600	DORY	15.8	3.96	1Aft/1Mid	496.25	6184	9.42	4.08	-1.7	Stern	2.0	0.85
2650	DORY	15.8	3.96	1Aft/1Mid	496.25	6184	9.42	4.08	-1.7	Stern	4.0	0.85
2700	DORY	15.8	3.96	1 Aft	331.25	5099	10.5	3.69	-2.5	Stern	2.0	0.70
2750	DORY	15.8	3.96	1 Aft	331.25	5099	10.5	3.69	-2.5	Stern	4.0	0.70
2800	DORY	15.8	3.96	1 Fwd	331.25	4236	5.44	3.53	1.63	Head	2.0	1.12
2850	DORY	15.8	3.96	1 Fwd	331.25	4236	5.44	3.53	1.63	Head	4.0	1.12

where:

JON = jonboat
DINGH = dinghy
RUNAB = runabout
Mid = amidships
I = moment of inertia in pitch
LCG = location of center of gravity aft of extreme bow
HGHT = height
FREEB = mean freeboard at the low boat end (exposed to waves)

2.3 TEST PROCEDURES

The tests were conducted in the Offshore Technology Corporation model basin at Escondido, California. The tank is 295 ft. long and 48 ft. wide. At the time of the test the water depth was 13 ft. The tank has the capability of producing regular or irregular waves up to about 2.3 ft. in height. Tests were conducted in head and following seas. In all cases the boats' speed was zero per typical scenarios developed for swamping type accidents.

The motion response parameters of interest were pitch, heave, instantaneous freeboard at the end of the boat facing the oncoming waves, (which was always loaded to be the low end), and the wave height at a fixed reference point with respect to the boat. According to the documented accident scenarios, boats involved in "fatal swamping accidents " are not under power at the time of the swamping.

Since the purpose of these tests was to produce RAO curves of the appropriate boat motions it was not necessary to simulate swamping conditions, per se. Indeed, if swamping did occur during testing, the dynamic characteristics of the boat would be modified by some unknown amount. Therefore the tests were conducted at two nearly constant wave heights. One was the highest that could be tolerated without the risk of water entering the boat. This height was nominally 6 inches in full-scale. Since the use of the RAO curves implies linearity of the motion response with wave height for infinitesimal heights, RAO curves were also obtained at the minimum wave height at which the responses could still be measured accurately. This height was about one-fourth of the wave height of the main test series, i.e., nominally 1.5 inches full scale. If the RAO curves produced at each wave height are essentially equal, then the response can be considered linear over the whole range of wave heights up to that which would cause swamping.*

In all tests, the static quantities were measured in the same manner, as follows. The weight, center of gravity and pitch moment of inertia of the lightboat were measured on the Offshore Technology's scales and swing table designed specifically for this purpose. The pitch inertia was confirmed in a few cases by swinging the boat. The weight, centers and inertia of the simulated payload and test

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*)The test series 100 (13.5 ft. jonboat in stern waves, loaded with one man sitting aft) was tested at three different wave heights, rather than two: 1.5, 3. and 6 inches. However, since the linearity was evident even in 6 inch waves, the results obtained with 3 inch waves are not shown, for simplicity of computerized plotting.

equipment were found by calculation. Appendix 2 presents the loading sheets for all test conditions.

The load was simulated as follows. The persons weight was simulated by pieces of lead attached to the seats or boat floor, as required by the internal arrangements of the boats. Typically the height of the lead center of gravity was 6 inches above the seat or floor level. The weight of a person was taken at 165 pounds. In all tests, except those of the dory boat and of the test series 1200, a 65-pound motor was attached in its designed location. The dory is a rowing boat, with no motor. The test series 1200 represents an even keel condition.

The tests were performed on three different occasions several months apart. During this time the tank ownership has changed, together with the test instrumentation and procedures. For this reson, different instrumentation and procedures were used in different tests. These are now described individually.

INSTRUMENTATION AND PROCEDURE IN TESTS 100-1350

Prior tests procedures [1,7] held the test boat at a fixed longitudinal position in the tank (i.e. at zero drift velocity) by tether lines attached at the deck level. These tethering methods seemed to modify the boat's pitch response. It would be desirable to tether a boat from the center of gravity to minimize any pitch constraints. But such a tether attachment point would permit the boat to yaw. It was decided therefore to tether the model from a point on the bottom about halfway between the center of gravity and the upstream end of the boat by means of a chain hung in a catenary from a point well upstream from the test boat. The static weight of the chain at the attachment point on the boat was considered as a constant load in the boat's weight and moment summary. It was considered that this method of tethering would have a minimal influence on the boat's motion response during testing and this was borne out by observations during the tests. Although the point of attachment of the tether chain, ahead of the center of gravity, was adequate to maintain the boat at the desired zero or 180 degree heading, a pair of light lines were arranged from the downstream end of the boat to the sides of the tank. These lines, which were normally left slack to minimize external constraints on the boat, were effective in correcting any temporary heading deviations.

Each train of regular waves of different period generated during the tests produced a different drift force on the boat. This caused the boat to drift to a different mean surge position during each test run. However, the instrumentation required that the boat be maintained at a

fixed mean surge position. This was accomplished by hauling forward on the tether line until the boat attained the correct steady state longitudinal position. Motion data was recorded for ten wave cycles after this steady state position was achieved.

For purposes of redundancy and reliability, pitch and heave measurements were each taken with two independent instruments. Pitch was measured with two vertical gyroscopes mounted athwartships from each other on the bottom of the boat.

The first instrument for measuring heave was an ultrasonic transducer mounted on the bottom of the boat beneath the center of gravity. It measured heave by recording the time for a sound wave to be reflected back from the concrete bottom of the tank via the shortest path. The second instrument for measuring heave consisted of a pair of rotary potentiometers mounted on the carriage above the boat. The potentiometers were rotated by wires which ran over sheaves on the potentioneter shafts. The wires were connected to the boat at its center of gravity. The potentiometer signals were then converted to the distances from the fixed position of the potentiometers to the center of gravity of the boat. Then, assuming no sway motion, these distances were converted by geometry, in real time by computer into pure heave and surge componants. Appendix 1 presents a derivation of the procedure. (Although the surge motion was obtained as a byproduct, it is not used in this study.) The accuracy of the heave measurements obtained by this method is somewhat less reliable than the acoustic method because the computations also depended upon a visual measurement of the mean surge position which was not always held steady. Nevertheless, the availability of this instrumentation enabled testing to continue on several occasions when the ultrasonic transducer failed.

Water height at the end of the boat was measured with a resistance-type wave probe mounted on the boat on the centerline in head waves and just to the side of the outboard motor in stern waves.

Wave height was measured by a resistance-type wave probe at the side of the tank (clear of any possible wave distortion by the boat) transversely aligned with the center of gravity of the boat.

Data reduction was performed on the Offshore Technology computer in real time and immediately following each run. The reduced data included the wave period, and the RAO's of each insrument signal. The exception were the phase angle computations which required separate and apparently long computer runs. The data printout included the statistics of all quantities measured and the RAO curves, including the phases. The measured quantities were also recorded on a

strip chart recorder. About 20% of the measurements were later discarded because they were observed to be strongly non-harmonic, irregular or interrupted on the strip chart recording, or when both sets of redundant instruments failed.

When both instruments were trusted, (e.g, in the pitch case), the final RAO curve was obtained by averaging the results of both instruments. In the heave case, the acoustic measurements were used alone, unless the acoustic transducer broke down in which case the potentiometer instrument data was used for the RAO curve. In all cases there was a single final RAO curve determined for each combination of the wave height, loading condition and motion mode.

The number of different wave frequencies was typically 20 to 40 in small waves and 5 to 15 in high waves. Tests were repeated up to four times at two wave frequencies in order to examine the scatter in the measurements.

Still photos were taken of each boat in each load condition and 16 mm. motion pictures were taken of all high wave tests.

INSTRUMENTATION AND PROCEDURE IN TESTS 1400-1950

The tethering system and the tank wave height measurements were identical to those described above. The heave and pitch motions were measured with the Offshore Technology Corporation's motion sensing transducer (MST), illustrated in Figure 7. The device consists of a telescoping arm which extends from a pivot point on the carriage to a pivot point on the boat. Through sensing and measuring the angular displacements at both pivot points and the extension of the arm, the six degree of freedom motions at the boat center of gravity, (as well as at any other point) can be computed. The MST was attached at the center of gravity of the light boat (which point has no essential relevance to the loaded boat but is convenient as a reference point). Motion data was computed for the center of gravity of the boat as loaded. A gyro was also installed on the boats, primarily for checking the readings of the MST, but its readings were not used in data processing.

Relative water height of the low end of the boat was measured by a wave probe mounted on each of the transom corners.

The phase angles were not measured in these tests, for economic reasons. All the tests were filmed on a TV video system.

INSTRUMENTATION AND PROCEDURE IN TESTS 2000-2850.

The heave, pitch and transom motions, as well as the wave height, were measured as in the tests 1400-1950. The tethering system consisted of four very light and extremely stretchable fishing lines attached to two boat ends at the waterline. Again, no measurements of the phase angles were taken, for economy reasons. The tests were filmed on TV video system.

Photographs of the boats in position for testing are shown in Figures 8 to 13.

2.4 TEST RESULTS

The results of the tests are presented in Figures 14 through 32 as plots of response amplitude operator (RAO) versus the ratio of wave length to overall boat length (LOA). Test series where the boat load condition is the same and only the wave height is different are shown in the same figure. Each test series is denoted by a distinct Figure number, with the individual motion modes being denoted by letters (a) to (e), as follows:

a) heave RAO (all tests)
b) pitch RAO (all tests)
c) transom relative motion RAO (all tests)
d) heave phase (lag),(tests 100-1100 only)
e) pitch phase (lag),(tests 100-1100 only)

The problem of linearity of the responses is summarized in Table 4. For each loading condition and motion mode, the table gives a yes or no answer to the question: does the motion response appear linear in wave height? The answer is strictly qualitative, however in the vast majority of the cases there is no doubt about it.

In most cases there is some small difference between the RAO curves measured in low and high waves, on the order of 10% and sometimes reaching 30% , but the experimental scatter of the points is just as much, and often even more. A difference of 20% is considered quite acceptable in the motion estimates, therefore such cases are considered to be linear.

There are only 4 cases out of the total of 64 in which the two response curves are radically different from each other, (heave, pitch and transom RAO's in Test 2300, and heave RAO in Test 2600). In Test 2300 the high-wave RAO's are lower than the low-wave RAO's, as expected. This case is therefore clearly nonlinear. Due to the trend of the nonlinearity, the linear predictions of the responses would give conservative estimates. In Test 2600 the high-wave heave response is dramatically larger than the low-wave response which is physically possible but very unlikely (see any theory of nonlinear vibrations). Furthermore, this occured only in heave, while both pitch and transom responses remain perfectly linear. Therefore it is suspected that the the apparent nonlinearity in this case is a result of an instrument malfunction.

It is interesting to note that the transom motion exhibits much more linear behavior than either the heave or pitch, which indicates that the nonlinear contributions of heave and pitch tend to cancel one another. This is a positive trend since it is the transom motion which is of primary interest in the swamping problem.

Because of the small height of freeboard of the half-scale model, the highest wave that could be used without swamping the boat was 1.5 inches. The wave maker produced low-amplitude transverse waves in the tank, particularly when generating short waves. These were of little consequence when testing the full-scale boats in larger waves but they contaminated the smaller waves during the half-scale model tests. The large scatter of the test results shown in Figures 18 is so great that no conclusions can be drawn regarding the linearity of the results or the effect of the scale. For this reason, test series 900 is discarded.

Table 4. Evaluation of Linearity of Motions

TEST SERIES	BOAT	Does the motion appear linear ?				
		HEAVE RAO	PITCH RAO	TRANSOM RAO	HEAVE PHASE	PITCH PHASE
100+ 200	13.5'JON	yes	yes	yes	yes	yes
300+ 400	13.5'JON	yes	yes	yes	yes	yes
500+ 600	13.5'JON	yes	yes	yes	yes	yes
700+ 700	13.5'JON	yes	yes	yes	yes	yes
900+1000	6.75'JON	-	-	-	-	-
1300+1400	8'DINGHY	yes	yes	yes	-	-
1500+1600	8'DINGHY	yes	yes	yes	-	-
1700+1800	14' JON	yes	yes	yes	-	-
1900+1950	14' JON	yes	yes	yes	-	-
2000+2050	RUNABOUT	yes	yes	yes	-	-
2100+2150	RUNABOUT	yes	yes	yes	-	-
2200+2250	RUNABOUT	yes	yes	yes	-	-
2300+2350	SKIFF	no	no	no	-	-
2400+2450	SKIFF	yes	yes	yes	-	-
2500+2550	SKIFF	yes	yes	yes	-	-
2600+2650	DORY	no	yes	yes	-	-
2700+2750	DORY	yes	yes	yes	-	-
2800+2850	DORY	yes	yes	yes	-	-

In summary, the motions are reasonably linear, with nonlinear contributions being of the same order as the experimental scatter of the points. Where the differences between the low and high-wave RAO's occur, the higher-wave RAO curve is lower, as expected. Therefore it is concluded that, for engineering applications of the present type, the motions can be treated as linear and that this conclusion results in a conservative estimate of the motions.

3.0 THEORETICAL PREDICTIONS OF BOAT MOTIONS

3.1 REVIEW OF THEORIES OF MOTIONS IN WAVES

The present discussion is limited to the motions in the vertical plane, i.e., heave and pitch and the vertical motion of the transom relative to the water level at the transom, since these are the motions of importance in the swamping problem.

Linear Theories

The theoretical predictions of ship motions in waves are fairly well established in the profession. The famous paper by St.Denis and Pierson published in 1953, [19], on the application of the principle of superposition to the ship-motion problem, suggested that the prediction of the motions in irregular waves can be performed in two steps. The first is to predict the motions in regular waves and the second to compute the motion spectra and statistics from these and from the wave spectra. This procudure is theoretically valid if the sea state is sufficiently low, however many results indicate that the predictions remain of high accuracy even in high sea states since the ship motions remain linear in wave amplitude up to fairly high wave heights.

The main theoretical effort has been directed toward predicting the linear motions in regular waves. The linear coupled equations of the heave and pitch motions can be written in the following form

$$[m+a_{33}(\omega)]\ddot{x}_3 + b_{33}(\omega)\dot{x}_3 + c_{33}x_3 + a_{35}(\omega)\ddot{x}_5 + b_{35}(\omega)\dot{x}_5 + c_{35}x_5 = F_3 + F_{D3}(\omega, a_{ij}, b_{ij})$$

$$a_{53}(\omega)\ddot{x}_3 + b_{53}(\omega)\dot{x}_3 + c_{53}x_3 + [I+a_{55}(\omega)]\ddot{x}_5 + b_{55}(\omega)\dot{x}_5 + c_{55}x_5 = F_5 + F_{D5}(\omega, a_{ij}, b_{ij}) \quad (1)$$

In these equations, m and I are the boat mass and pitch moment of inertia in air; they are the only terms which are known exactly. The terms c_{ij} represent coefficients of the hydrostatic restoring forces (the waterplane area and its moments). F_i are the hydrostatic parts of the wave excitation forces, often called the Froude-Krilov forces. Under the assumption of linearity of the motions, the waterplane area and shape must be assumed constant, this implies that the vessel is assumed to be wall sided. The terms $a_{ij}(\omega)$, $b_{ij}(\omega)$ and F_{Di} are respectively the hydrodynamic added mass, the wave making damping and the diffraction part of the wave excitation force (the part resulting from the disturbance of the incident wave system by the wave reflection on the body and by the body motions). The diffraction part of the excitation is an explicit function of a_{ij} and b_{ij}, therefore the total hydrodynamic problem reduces to the calculation of these

two groups of terms, and this is by far the most difficult and involved computational task. Also, these are the only terms that are subject to differences among various theories. The terms can be expressed as sums of the contributions which are and are not dependant on the forward speed of the vessel. There is still some uncertainty regarding the speed-dependent terms, however there is a consensus regarding the speed-independant terms. In the present problem where the speed is zero, all speed dependant terms drop out.

There are two procedures with practical usefulness for computing the terms a_{ij} and b_{ij}, the strip theory method and the 3-D source distribution method.

Linear Strip Theory of Ship Motions

Several linear theories have been developed based on the so-called strip theory in which it is assumed that the fluid flow changes much less in the longitudinal ship direction than in the transverse direction and therefore the total three-dimensional flow problem can be divided into two-dimensional flow problems separately for each ship section and, upon solution, integrated over the ship length. Under this assumption the terms a_{ij} and b_{ij} in equations (1) are computed first for the ship segments individually, where each segment is replaced by a 2-D cylinder of the cross section equal to the ship station, and then integrated over the ship length to yield the added mass and damping for the entire ship. There are three competing methods for computing the two dimensional quantities, they are all roughly similiar in terms of the computational efficiency They are reviewed in detail in [4] and [17]. The most popular method seems to be the source method where 2-D sources are distributed over the contour of each section.

The most recent and complete linear theory is possibly that developed by Salvesen et al., in 1970, [17]. Based on this theory a computer program has been developed by NSRDC and Det Norske Veritas in 1971, [9]. The program predicts the ship motions in all six degrees of freedom in regular waves of arbitrary direction. The program has been demonstrated to predict the vertical motions with almost perfect accuracy, provided the theory assumptions are not violated. These assumptions are summarized as follows.

- Ship is long and slender with smooth and moderate changes of shape in the longitudinal direction. The length is much larger than the beam and draft.

- The theory assumes that the waves are short, of the order of the ship beam rather than

length. This assumption is necessary in order to justify the 2-D calculation of the hydrodynamic terms in the equations of motion. The results for long waves are still predicted quite accurately but this is in spite of, rather than due to, the theory characteristics. Namely the ship behaviour in long waves is governed primarily by the hydrostatic terms (m,I and c_{ij} in equations 1) therefore the large relative errors of the hydrodynamic terms do not affect much the final accuracy.

- A large-transom stern is detrimental because it would constitute a sharp change of shape in the longitudinal direction.

- The ship is assumed to be wall-sided.

- The diffraction part of the excitation force is predicted accurately only on parallel midbody. The end sections are subject to larger errors. A transom stern may especially cause errors in the diffraction terms at slow or zero ship speed. The lack of accurate diffraction calculation on ships with a transom may cause poor predictions of the motion of the transom relative to the wave elevation for two reasons. The first is that the motion in real life occurs relative to the sum of the incident and diffracted waves while the diffracted wave height cannot be determined directly by the theory; the predictions can only indicate the motion relative to the incident wave alone. Therefore when the diffracted wave is comparable in height to the incident wave (as is the case on transom sterns in short stern waves), the relative motion may be computed inaccurately. Secondly, the heave and pitch motions themselves may be computed inaccurately due to the diffraction force errors.

In spite of the above limitations the vertical motions can be predicted very well on typical ships, as is demonstrated in [17].

Linear 3-D Singularity Distribution Methods

The next category of the linear theories is based on the three dimensional distribution of the singularities on the underbody, [5] and [14]. The equations of motion still have the form identical to (1) but the hydrodynamic terms

a_{ij} and b_{ij} are now computed directly for the entire body through a distribution of singularites on the body surface. This approach removes the restriction of the body shape, it can theoretically be used on any shape. It has been demonstrated to be succesful on semi-submersibles, discs, spar buoys, square barges and many others.The main disadvantage of this approach is that it requires relatively long computations. For example, with the strip theory program HANSEL, a typical ship can be divided into 20 segments with 8 singularities per segment thus requiring 20 solutions of the 8x8 systems of the simultaneous equations for their source strength per frequency. In the present case, to yield the same frequency range it would be necessary to solve 20x8=160 equations for 160 unknowns per frequency. In general, this approach is said to be one order of magnitude more involved computationally.

Another practical argument against this theory is that there are no computer programs of this type available in the public domain, to the author's knowledge. The programs which are proprietary are not yet in a form sufficiently finished to allow their routine use. In contrast, the strip-theory programs are used routinely in the profession.

Non-Linear Theories

Some nonlinear effects can be quite important in high waves. They are variations of waterplane area and shape with the motions and instantaneous water elevation, and viscous damping which is known to be quadratic or cubic in velocities. The equations of motion which incorporate these effects can be solved in some limited cases in the frequency domain e.g., [13,16,20], but by far the more general method of solution is based on the time domain integration of the equations, i.e., simulations, as discussed in [3,11 and 18]. Almost any nonlinearity can be treated with relative ease in the simulations and some theories go into remarkable detail of computing the nonlinear terms. For example, the computer program CAPSIZE developed by Paulling et al, [3], computes the hydrostatic and Froude-Krilov terms almost exactly for the instantaneous relative position of a three-dimensional irregular wave and the vessel. The hydrodynamic terms are often computed with the strip theory assumptions, e.g., [3]. The simulations typically require fairly expensive computations, although they can yield excellent results.

A disadvantage of this method, other than the cost, is that it may be insufficiently accurate in the simulations in irregular waves since it does not include the frequency variations of the added mass and wave damping. Although there are theoretical procedures for incorporating these variations in the time domain, there is no motion

prediction program which would include them, to the author's knowledge. These two quantities are treated as being constant for all frequencies, equal to their asymptotic high frequency values. The variations with frequency are not important in long waves since the motions are then governed primarily by the hydrostatic effects. Therefore the theory yields excellent results for roll and capsizing predictions for slender ships in following waves, when the frequency of encounter is very small. Unfortunately, in shorter waves the predictions are less accurate and the jonboat swamping problem falls into this category. The need for direct simulations in irregular waves stems from the fact that if the motions are nonlinear in the wave height, the concept of the response amplitude operator ceases to be valid. The nonlinear responses may be non-harmonic and also there can be an infinite family of the RAO curves (instead of just one curve) depending on the wave height. Therefore one cannot simply multiply the RAO's obtained from the nonlinear simulations by the wave spectrum to obtain the motion spectrum. Instead the latter must be computed directly from the simulated irregular-motion records.

3.2 RELATIONSHIP OF BOAT CHARACTERISTICS TO THE ASSUMPTIONS OF MOTION THEORIES

All recreational boats studied here, jonboats, dinghies, runabouts, skiffs and dories, have a small length to beam ratio even when floating at even keel, typically between 2 and 5 . Since the draft is very small and the bottom is flat, when the boats are loaded at either end, the underbody length to beam ratio decreases to typically between 1 and 4. This range is supposed to be well outside the range of applicability of strip theory.

The low draft on all boats, together with a large trim may cause the boats to have a large and low overhang. Therefore when the boat heaves and pitches in waves, the waterplane area and its moment about the boat center of gravity may vary strongly. This violates the assumption of the linear theories that the hydrostatic forces are proportional to the motions.

Also, the hydrodynamic terms which are computed based on the constant shape underbody are no longer quite valid since the underbody shape changes strongly even at small boat motions. This deficiency applies to all theories.

Most of the boats have flat, almost vertical transoms of full beam. Jonboats and dingies have transoms at both stern and bow. Runabouts and skiffs have it only at the stern. Therefore the wave diffraction may be quite strong in longitudinal waves and this is not taken accurately into the account by the strip theories.

The motions of the boat transom edge relative to the water level, (i.e., the relative transom motion) are of particular importance in the swamping problem. The RAO of this motion is a sum of the heave and pitch motions and the water elevation at the transom. Taking into consideration the in phase and out of phase components, the motion RAO, r , can be written as follows.

$$|r|=\{[|x_3|\cos\varepsilon_3 + \bar{x}|x_5|\cos\varepsilon_5 - \cos kx]^{1/2} + [|x_3|\sin\varepsilon_3 + \bar{x}|x_5|\sin\varepsilon_5 - \sin kx]^2\}^{1/2} \qquad (2)$$

where $|x_3|$ and $|x_5|$ are the heave and pitch RAO's, ε_3 and ε_5 their phases, $\bar{x}$ is the distance from the center of gravity to the transom, and k is the wave number. The terms coskx and sinkx represent the in-phase and out-of-phase contribution of the incident wave elevation under the transom. In many ship applications, the diffracted wave height is small relative to the incident wave height, therefore the terms coskx and sinkx can be taken to represent approximately the total wave. In the case of

large-transom boats, the reflected wave can be comparable in height to the incident wave. Then the total wave at the transom will be different than the incident wave and the prediction based on equation (2) will be inaccurate.

Difficulty of a more simple but nevertheless important nature occurs with runabouts. These boats typically have tri-hull shapes, or bi-hull with a tunnel. Such shapes cannot be treated directly by the algorithm of the popular strip-theory computer programs (HANSEL or SCORES). In order to use the programs, it is necessary to "cheat" by making the offset heights monotonically increasing.

It is evident from the above discussion that there is no theory which could be directly applicable to the recreational boat problem. The linear strip theory appears to be the least suitable for this purpose. However this is the only theory which can be used routinely, easily and inexpensively. For these reasons, and because the other two theories are not completely suitable to the boat problem either, the present work concentrates on establishing the accuracy and the range of applicability of the linear strip theory for the boat motion problem. To the author's knowledge this question has been only marginally adressed in the context of experimental work, [1,6,and 18].

3.3 MODIFICATIONS MADE TO HANSEL

Two changes were made in the code of the strip-theory program HANSEL, [9]. The first was to include the prediction of the relative transom motion as described by equation (2) above.

The second change involved the subroutine SIMPUN which performs the Simpson integration of the offsets. The original version is suitable only for the sectional shapes without breakpoints. When breakpoints are present, parabolas are fitted across them instead of straight lines and this may result in totally incorrect integration. The dory, skiff, jonboat and dinghy boats have a breakpoint on most of the stations at the hard chines. The runabouts have several breakpoints on each station. In all cases the offsets are connected by streight lines. Therefore the Simpson integration was replaced by the trapezoidal integration.

The hull offsets input to the program HANSEL must describe the body up to the mean water level only. Therefore a different set of offsets must be prepared for each different loading condition. Since the offset geometry is very restrictive in the program, this would make a tedious task. To avoid it and to assure accuracy, a satellite program has been written which accepts the hull offsets in arbitrary form, as well as the boat displacement and center of gravity location, then it computes the equilibrium draft and trim by iterations, and finds the offsets of the underbody in the HANSEL format, using 3-D interpolation.

3.4 COMPARISON BETWEEN THEORY AND EXPERIMENTS

The results are organized into sets of figures numbered 33 through 50, each set labeled with up to six letters (a through f). The different numbers correspond to different boat and boat loading combinations. The letters correspond to the different responses. Exceptions are the figures labeled with letter "a" which presents a sketch of the boat offsets as "seen" by the program HANSEL, i.e., the offsets defined up to the load waterline only, and distributed as required by the input algorithm. The letters b through f label the following motions:

b) Heave RAO (all cases)

c) Pitch RAO (all cases)

d) Transom Relative Motion RAO (all cases)

e) Heave Phase (tests 100-1350 only)

f) Pitch Phase (tests 100-1350 only)

All experimental results shown in this section were obtained at the wave height of 1.5 inches full scale. The experimental points are shown by triangles, the theoretical predictions by dashed lines. Also shown are the least-square fit curves through the experimental points. These will be used later in statistical analysis of the motions.

The dashed-dotted lines shown in a sample of the figures illustrating the transom motion show the theoretical motion envelope without diffraction. This is the transom motion that would occur if all three, heave, pitch and the incident wave trough at the transom occured in-phase. The envelope is computed from eqn.(2) by taking the phase angles of the heave, pitch and the wave at transom equal to zero. In the absence of the diffracted wave at the transom, the envelope would be larger than all measured RAO points. It will be shown that this is not the case, and the difference will serve as an indication of the intensity of diffraction phenomenon.

The results are discussed individually for each boat and loading combination. Note that the headings include the effective length to beam ratio (ratio of wetted length to wetted beam).

13.5-ft. Jonboat, 1 Man Aft, Stern Waves, L/B=2.92
(Figures 33 abcdef)

The experimental and theoretical heave and pitch RAO's compare quite well. There are still differences in the RAO results in the long waves, but the overall shape and areas of the curves are similiar.

The phase angles compare well in the medium and long waves, and poorly in short waves. This is caused by the strong diffraction phenomena near the transom. The phases oscillate so strongly in the short waves that in some cases it was difficult to draw the phase curve; it could go in either direction on the phase plane. Therefore the phase results should be treated with caution in the short wave length. The transom RAO is predicted quite well by the theory except in the short waves. The intensity of the diffraction in the short wave region can be best observed from the motion envelope curve; it lies below the measured motions.

The effective length to beam ratio (based on the underbody length and beam) was in this case 2.92 and this value is theoretically well outside the intended range of the strip theory. In this context, the theoretical predictions are remarkably good.

13.5-ft. Jonboat, 2 Men Aft, Stern Waves, L/B=2.47
(Figures 34 abcdef)

The boat is now trimmed heavily by the stern. The bottom overhang is steeper than before, therefore the waterplane variations should be smaller, causing less error in the hydrostatic terms in the equations of motion. On the other hand, the transom is immersed deeper, with larger projected area, thus it presents a larger obstruction to the waves. The theoretical and experimental heave and pitch motion curves still agree in the general shape. At resonance the comparison is poorer than in the first test series, as expected, due to the stronger diffraction.

The transom RAO's compare worse, especially in shorter waves. However, even in this case the location of the response peak on the frequency axis is predicted properly.

13.5-ft.Jonboat, 1 Man Aft and 1 Midship, Stern Waves, L/B=3.9
(Figures 35 abcdef)

In this case the boat has a low trim, long waterline and the transom is relatively little immersed. The effective length/beam ratio is increased to 3.9. Since this case is the closest to a slender ship, it should yield the best theoretical predictions. The results confirm the

expectation. Except in very short waves, the agreement is good.

13.5-ft. Jonboat, 2 Man Forward, Head Waves, L/B=3.0
(Figures 36 abcdef)

This loading condition is the least suitable for the strip theory. It causes the wide bottom in the aft portion of the boat to make a very long and wide overhang at small trim angle. Thus even small motions may result in strong changes in the waterplane area. Also, the bow transom is now deeply immersed resulting in a large obstruction to the waves.

The heave RAO is still predicted fairly well. The theoretical pitch RAO is rather strongly underestimated at resonance. Except in the short waves, the phases are predicted well. The transom motion is rather poorly predicted.

8-ft. Dinghy, 1 Man Aft, Stern Waves, L/B=1.5
(Figures 37 abcdef)

This boat as loaded has the underbody shape which violates the theoretical assumptions the most. The effective length/beam ratio is now only 1.5. The boat has an exceptionally wide and flat transom which has the largest width of any boat section. This presents a very large obstruction to the waves. The boat also has a large overhang. The boat motions turned out to be relatively large in this series. This caused large periodic immersion of the overhang, and thus relatively large nonlinearity in the hydrostatic terms.

These deficiencies are reflected in the results. The general trend of the shape of the theoretical curves is still predicted well, but the magnitudes are not. The theoretical RAO's are lower by a factor of 1.5 to 3 at resonances. The phases however compare well, except, as usual, in the short-wave range.

These results indicate that the length/beam ratio of 1.5 lies outside the range of applicability of the linear strip theory. To verify that it is the strip theory that causes large errors rather than the nonlinearities, a few sample calculations were performed by Paulling using his linear theory based on the 3-D source distribution, (computer program HYDRO3, [14]). These results are shown in Figures 37 bcdef by squares with interconnecting lines. The agreement between this new theory and the experiments appears to be outstanding for all three motions. This would support the above conjecture. However, the results of the following test throw a different light on it.

8-ft. Dinghy, 1 Man Aft, Stern Waves. L/B=1.48
(Figures 38 abcd)

These results were performed in the second test series, with the MST instrumentation described in Chapter 2. The boat loading condition was intended to be the same as in the last case, however small differences in the weight and inertia were noted, of approximately 2 to 10%. These are small enough differences to expect that the measured motions would be similiar to the last case.

The RAO curves of transom motion, and to a slightly lesser degree pitch motion are indeed similiar. Heave RAO differs rather drastically. This could indicate that the heave RAO is extremely sensitive to the loading conditions, however, it is rather unlikely. The only other explanation is that the instrumentation did not work properly in one of the two tests.

In the first test series, agreement between the measured heave and HANSEL predictions was poor, and between the measured heave and the 3-D prediction good. In the present test, agreement between the measured heave and HANSEL is excellent. Both HANSEL predictions are almost identical, thus indicating low sensitivity to the loading condition. Therefore it can be expected that the 3-D predictions would also be similiar in both cases (the 3-D model was used only in the first test).

If the fault of the instruments occured in the first test series, the apparent agreement between the 3-D theory and the measurements would have to be declared coincidental, and the HANSEL predictions would then be succesful. If the instrument fault occured in the present test, it should also affect other motions (pitch and transom) and this was not the case. Therefore it is strongly suspected that the present test is more reliable and that the apparent success of the 3-D model was coincidental. (This is not to say that, on the average, the 3-D model would not be better than the strip theory.)

Regarding the comparison between HANSEL and the measurements, it can be noticed that the heave curves agree ver" well and the pitch and transom motions are underpredicted. This indicates that the proportions of the 8 ft. boat exceed the limits of HANSEL applicability.

8-ft. Dinghy, Even Keel, Head Waves, L/B=1.87
(Figures 39 abcd)

The agreement between the measured and predicted heave RAO's is still fair. Both curves follow the same shape, the theory slightly overestimating the motion.

Agreement in the pitch case is worse, but the same pattern is still evident. The worst agreement occured in the transom motion case. The two curves differ not only quantitatively but also qualitatively. This indicates that the limits of the strip-theory have been exceeded.

14-ft.Jonboat, 2 Men Aft and 1 Amidships, Stern Waves, L/B=2.69 (Figures 40 abcd)

The theoretical motion predictions are excellent, approaching the quality normally expected in ship applications. The transom RAO prediction is especially good.

14-ft. Jonboat, 2 Men Forward and 1 Amidships, Head Waves, L/B=3.6, (Figures 41 abcd)

In this case, the stern transom is slightly emerged and the boat bottom at the stern makes a small angle with the water level. The bow exposes a wide and strongly tilted 'wall' to the waves.

The theoretical predictions are very poor for the transom RAO and good for the heave and pitch. This is consistent with the previous results of boats in head waves. Apparently the diffraction phenomena at the bow in head waves are very strong and this is not covered adequately in the strip theory.

Runabout,3 Men Aft and 2 Amidships, Stern Waves, L/B=2.56 (Figures 42 abcd)

The boat has a large transom quite exposed to the waves, and long overhang. Also, it has rather complex tri-hull shape which is not taken properly into the account in the HANSEL offsets.

The results reflect these deficiencies. Though the pitch is predicted well, heave is marginal and the transom motion is very poor. It should be pointed out that a runup was observed on the transom during most tests. This could explain the grossly incorrect prediction too.

Runabout, 3 Men Aft, Stern Waves, L/B=2.46, (Figures 43 abcd)

As in the last case, pitch prediction is fair and heave and transom motion ones poor, probably for the same reasons as before.

Runabout, 2 Men Forward and 2 Amidships, Head Waves, L/B=1.53, (Figures 44 abcd)

The boat has a rather low-buoyancy bow, and when 2 persons were placed on the bow deck, the bow immersed quite strongly. This caused the boat underbody to have quite an unusual shape, aparently not "appreciated" by the strip theory. The heave and pitch predictions are both good, but the transom motion is very poor again, indicating that strong diffraction must have taken place at the bow.

Skiff, 2 Men Aft and 1 Amidships, Stern Waves, L/B=2.39 (Figures 45 abcd)

This is the test series which was demonstrated to be quite nonlinear in wave height (see Figures 27). Therefore it is not surprising that the theoretical linear predictions are poor.

Skiff, 1 Man Aft and 1 Amidships, Stern Waves, L/B=2.63 (Figures 46 abcd)

Again, the heave and pitch predictions are fair to good but the transom motion prediction is very poor, thus indicating strong diffraction.

Skiff, 2 Men Forward and 1 Amidships, Head Waves, L/B=2.75 (Figures 47 abcd)

Once again, the heave and pitch are fair to poor and the bow motion prediction is poor. However, the latter motion prediction is better in this head wave case than in the stern waves discussed above. This may be due to the fact that the skiff bow is pointed, thus causing less obstruction to the waves than a flat transom of the other boats.

Dory, 1 Man Aft and 1 Amidships, Stern Waves, L/B=4.08 (Figures 48 abcd)

As mentioned before, this boat has long and narrow overhangs, rapidly flaring sides, and it is almost double-ended.

The heave and pitch responses are fair and good, respectively, and the transom motion prediction is very poor. It is interesting to notice that, contrary to almost all previous cases, the prediction is now better in short waves than in the long ones. This indicates that the diffraction is relatively weak, as might be expected since the boat is quite slender with pointed ends. It also

indicates that the shape nonlinearity must have been strong in the long waves.

Dory, 1 Man Aft, Stern Waves, L/B=3.69,
(Figures 49 abcd)

The results are basically the same qualitatively as in the last case.

Dory, 1 Man Forward, Head Waves, L/B=3.53,
(Figures 50 abcd)

This last case exhibits interesting but disappointing results. The heave and pitch predictions are very poor, but the transom motion prediction is surprisingly good, except in the long waves.

Table 5 presents a quick summary of the present results. It lists for each boat and loading case the effective length/beam ratio, and a strictly judgemental grade description (4=very good, 3=good, 2=fair, 1=poor and 0=very poor) of each prediction.

Table 5. Summary of the HANSEL Predictions

TEST SERIES	BOAT	WAVE DIR. (from)	LOAD	L/B	QUALITY OF HANSEL PREDICTION OF				
					HEAVE RAO	PITCH RAO	TRANSOM RAO	HEAVE PHASE	PITCH PHASE
100	13.5'JON	STERN	1A	2.92	3	3	3	3	3
300	13.5'JON	STERN	2A	2.47	1	1	2	2	3
500	13.5'JON	STERN	1A/1M	3.90	2	4	3	2	2
700	13.5'JON	HEAD	2F	3.09	2	1	1	2	2
1100	8'DINGHY	STERN	1A	1.50	0	0	1	1	0
1300	8'DINGHY	STERN	1A	1.48	3	2	1	-	-
1500	8'DINGHY	HEAD	LEVEL	1.87	2	2	1	-	-
1700	14' JON	STERN	2A/1M	2.69	2	4	4	-	-
1900	14' JON	HEAD	2F/1M	3.02	2	3	0	-	-
2000	RUNAB.	STERN	3A/2M	2.56	1	4	0	-	-
2100	RUNAB.	STERN	3A	2.46	1	3	0	-	-
2200	RUNAB.	HEAD	2A/2M	2.82	3	4	0	-	-
2300	SKIFF	STERN	2A/1M	2.39	0	0	0	-	-
2400	SKIFF	STERN	1A/1M	2.63	2	3	0	-	-
2500	SKIFF	HEAD	2F/1M	2.75	2	3	0	-	-
2600	DORY	STERN	1A/1M	4.08	2	3	0	-	-
2700	DORY	STERN	1A	3.69	1	2	0	-	-
2800	DORY	HEAD	1F	3.53	0	0	1	-	-

where:
1A,2A,...=one, two men sitting on aft thwart
1M,2M,...=one, two men sitting on midship thwart
1F,2F,...=one, two men sitting on forward thwart.
L/B =effective length to beam ratio

It is obvious from this table that the motion predictions, especially those of the transom RAO, are poor on the average, and that in the range of the length to beam ratios analyzed, no trend can be seen of improving the prediction quality with the ratio value.

3.5 PRACTICALITY OF DERIVING THEORETICAL CORRECTION FACTORS

It was hoped at the beginning of this study that the differences, if any, between the measured and theoretical RAO curves would exhibit some evident trends which could possibly be corrected by empirically-derived "fudge factors", or safety factors. For example, a proportional or constant shift in the frequency and/or value of the curve peak could be adjusted by applying correction factors to the added mass and/or damping coefficients.

The experimental results indicated that the peaks are very flat since the system is strongly damped, therefore adjustments to the resonance frequency would be rather difficult to make. Also, there is no evident trend of the errors; they are quite random. These reasons make the idea of deriving corrections impractical.

Also considered was a simple multiplication of the RAO curves by constants. This would be possible if the theoretical curves displayed some consistent pattern e.g., underprediction by a constant factor. Since no such trend can be observed, the correction is not possible. In the pitch case, underestimation occured more frequently than overestimation, but with too little consistency to suggest using some particular correction factors. Sargent, [18], tried to decrease the pitch damping coefficients by 30% in a similiar application. The "corrected" results were not much better, and they were certainly much less justifiable theoretically.

4.0 PREDICTION OF SWAMPING TENDENCIES OF BOATS

Before proceeding further with the project it was necessary to gain some understanding of the magnitude of the swamping probability under realistic conditions. For this reason, it was decided to perform a quick study of swamping tendencies of the boats in a sample of "typical" wave conditions. A quick survey of literature revealed that wave data is very scarce for regions where small recreational boats are active. Two wave spectra sources were found, [2] and [15], both apparently applicable to waters with small boat activity, but, as it will be shown shortly, both representing rather severe wave conditions for small boats. An additional deficiency with the spectra of [2] is that they are very irregular, thus indicating poor spectral measurements.

Seven wave spectra were used. They are described in Table 6 (listed in the order of increasing wave height). The spectra are also reproduced (from originals) in Appendix 4. The first two spectra came from [15] and the rest from [2].

Table 6. Wave Spectra

No.	Location	Date	Time	HS ft.	TA sec.	Wind mph	Depth ft.	Condition of waves	Boats present?
1	S.F.Bay	09-23-71	1415	0.63	2.10	?	?	?	?
2	S.F.Bay	09-21-74	1616	0.96	2.86	?	?	?	?
3	Lk.Erie	08-24-74	?	0.97	2.25	10-15	24	rough	few
4	Ches.Bay	10-22-74	1030	1.63	2.12	13	?	rough	few
5	Miami	10-03-74	1045	1.87	2.23	10-15	13	v.rough	no
6	Gulf.Mex	10-22-74	?	3.21	4.31	7-10	25	v.rough	few
7	Gulf.Mex	10-22-74	?	5.67	4.91	3- 5	25	rough	yes

The columns in the table denote:

Date = month-day-year
Time = time on 24-hour clock
HS = significant wave height (nominal in the case of spectra 1,2)
TA = average apparent period
The remaining columns should be self-explanatory.

The last two columns of the above table should be understood as being applicable to small recreational boats only.

The analysis is concerned with several aspects of the problem, as follows.

- Prediction of the expected number of swampings per hour of the boats tested in various load and wave conditions based on the measured and theoretically-predicted RAO's of the relative transom motion.

- Prediction of the increase of the freeboard at the low boat end necessary to reduce the probability of swampings below a certain level, again based on the two sets of the RAO's.

- Determination whether or not the freeboard increase required for a reasonable level of safety is practical.

- Determination whether the theoretical predictions are of sufficient accuracy.

It is important to point out that the present analysis is a short study intended to help in understanding the magnitude of the physical processes involved and in making decisions about the further work on this project, rather than to be a complete task sufficient for writing a safeloading regulation.

4.1 PROCEDURE

The measurements of the RAO's of relative transom motion helped to establish that the motion is reasonably linear in wave height. Therefore the classical linear theory of deck wetness and ship slamming, (presented, for example, in [16]), can be used in this analysis. Its major steps are now discussed briefly.

The range of the wave length to boat length ratios ("λ/LOA") of the RAO curves was approximately [0.4,2.0] in the experiments and [0.1, 3.0] in the theoretical calculations. The "experimental" range is shorter due to testing facility limitations; the lower bound being limited by the drive mechanism of the wavemaker and the upper bound by the depth of the tank (longer waves would be of the shallow-water type and thus undesirable). These values translate into the values of frequency in Hz as given in Table 7.

Table 7. Range of Frequencies of RAO's

BOAT	FREQUENCY RANGE IN HZ			
	RANGE OF THEORETICAL RAO		RANGE OF EXPERIMENTAL RAO	
	LOWER(λ/L=3)	UPPER(λ/L=.1)	LOWER(λ/L=2)	UPPER(λ/L=.4)
8' DINGHY	0.46	2.53	0.56	1.26
12.1'SKIFF	0.38	2.05	0.46	1.03
13.5'JONBOAT	0.36	1.94	0.44	0.97
14' JONBOAT	0.35	1.91	0.43	0.96
15.3'RUNABOUT	0.33	1.83	0.41	0.91
15.8'DORY	0.33	1.80	0.40	0.90
where L = length overall, LOA.				

The range of frequencies in the spectra extends from about 0.05 to 0.8 Hz, (see Appendix 4). Therefore it is necessary to extrapolate the RAO curves for longer waves. First, the experimental RAO's are extrapolated up to λ/LOA values of 3.0, i.e., to the bound of the theoretical curves, for consistency. The extrapolation used here assumes that the theoretical results are correct at λ/LOA of 3. This assumption is justified by the asymptotic behavior of the relative transom motion RAO which should approach zero in very long waves, and by the fact that the linear motion theory does indeed give good predictions in long waves where the motions are governed primarely by hydrostatics with negligible diffraction. Therefore each experimental RAO curve has been extended by a straight line to cross the theoretical curve at λ/LOA of 3. The exceptions are the cases where the slope of the extrapolation would be positive. A positive slope is inadmissible since the RAO must decay asymptotically to zero in long waves. In such cases, the slope was made to be

zero, i.e., the RAO at λ/LOA of three was made equal to the last non-zero value of the RAO curve. The extrapolation beyond λ/LOA of three was taken to be with zero values of the RAO curves. This makes the statistics of the motion to be slightly underestimated.

The experimental curves are obtained by curve fitting of the experimental results. The fitting technique is based on the spline theory, [8].

The last operation performed on the RAO curves involved converting them from the λ/LOA domain to frequency domain, with frequency measured in Hz.

The above steps were performed with help of a computer program named CGRAO, running on the inhouse microcomputer.

A spectrum of the relative transom motion is defined simply as

$$S_T(f) = S_W(f)\, H_T^2(f) \tag{3}$$

where

$S_W(f)$ = wave spectrum
f = frequency in Hz
$H_T(f)$ = response amplitude operator

The significant motion, defined as the average of one-third highest motions, can be shown to be

$$z_{1/3} = 4\sqrt{m_o} \tag{4}$$

where m_o is the zero-th order spectral moment

$$m_o = \int_0^{\infty} S_T(f)\,df \tag{5}$$

It is convenient to define now the second spectral moment for later use,

$$m_2 = \int_0^{\infty} f^2\, S_T(f)\,df \tag{6}$$

Since both the RAO curves and the wave spectra are defined numerically by rather irregular curves, the above integrals must be computed numerically with interpolation of both curves (RAO and wave spectrum) at all their frequencies.

The expected number of swampings per hour, named ENOS, is computed after [16] as

$$\mathrm{ENOS} = 3600\sqrt{\frac{m_2}{m_o}} \cdot \exp(-F^2/2m_o) \qquad (7)$$

where F is the static freeboard.

The steps described by equations (3) to (7) were handled with help of a computer program named SPEC, written to execute on a microcomputer.

4.2 PREDICTION OF SIGNIFICANT MOTIONS

Table 8 presents the significant values of the transom motion for all loading conditions and for all 7 wave spectra. The table consists of two parts, the first illustrating test load conditions 100-1900 and the second the remaining conditions. The results include those based on the experimental RAO curve and denoted "EXPER.", on the theoretical RAO curve and denoted "THEORY", and the relative error, denoted "ERROR" and defined as

$$\text{ERROR } \% = 100 \left| z_{1/3} \text{ (theory)} - z_{1/3} \text{ (experiment)} \right| / z_{1/3} \text{ (experiment)}$$

The following conclusions are drawn from these results.

1) An increase in significant wave height does not necessarly increase the significant motion. The different spectra not only have different areas but also are distributed differently (and quite randomly !) on the frequency axis. The randomness of the spread appears to be much more pronounced than that of the fully developed waves in open waters. This is not surprising in view of the fact that waves on small water basins are shaped not only by predominant wind but also by local wind eddies, refraction, reflection, depth changes, boat activities and local currents. The trancation of the RAO curve tails may have contributed to this non-monotonic behavior too.

   Since it is impossible to indicate at this time which spectrum is "more typical than others", or what is a "typical critical spectrum" further research would be needed to define what kind of wave spectra are to be used in implementing the regulation.

2) The errors of the theoretical predictions vary from 1.2 to 215.7 % . The error is significantly smaller on jonboats (maximum error of 72.7%, with 65 % of the conditions having the error smaller than 25 %), and larger on the other boat types. This is as expected since the long jonboats approximate ship proportions (for which the theory is intended) more than the other boats.

Table 8a. SIGNIFICANT RELATIVE TRANSOM MOTION (FEET)

SPECTRUM		1	2	3	4	5	6	7
HS (FT.)		.74	.96	.98	1.69	1.92	3.20	5.69
TEST NO.								
100	THEORY	.73	.52	.84	1.70	1.53	.48	.88
	EXPER.	.91	.62	1.10	2.16	1.96	.45	.91
	ERROR	20.1	17.4	23.2	21.3	21.8	6.3	4.1
300	THEORY	.80	.57	.92	1.87	1.68	.53	.97
	EXPER.	.98	.69	1.22	2.52	2.24	.46	.91
	ERROR	18.7	17.7	24.3	25.8	24.8	16.0	7.1
500	THEORY	.90	.68	.96	1.91	1.77	.73	1.28
	EXPER.	.79	.59	.90	1.78	1.67	.58	1.02
	ERROR	14.1	15.8	6.2	7.0	6.5	25.5	25.9
700	THEORY	1.91	1.64	1.92	3.71	3.75	2.11	3.35
	EXPER.	1.71	1.35	1.78	3.41	3.36	1.38	2.53
	ERROR	11.3	21.1	8.1	8.8	11.6	53.1	32.4
1100	THEORY	.59	.38	.70	1.39	1.23	.29	.61
	EXPER.	.96	.63	1.27	2.68	2.26	.33	.72
	ERROR	39.2	40.5	44.7	48.0	45.6	12.7	14.9
1300	THEORY	.55	.35	.66	1.31	1.16	.27	.57
	EXPER.	1.03	.68	1.31	2.66	2.33	.35	.82
	ERROR	46.3	48.5	49.3	50.5	50.1	24.1	30.3
1500	THEORY	.55	.35	.64	1.24	1.11	.29	.61
	EXPER.	.65	.43	.77	1.59	1.39	.31	.68
	ERROR	16.2	19.3	17.5	22.3	20.3	7.0	9.8
1700	THEORY	.85	.65	.92	1.83	1.71	.69	1.21
	EXPER.	.91	.66	1.04	2.04	1.89	.59	1.10
	ERROR	6.0	1.2	11.8	9.9	9.6	16.3	9.7
1900	THEORY	1.83	1.70	1.88	3.61	3.85	2.15	3.33
	EXPER.	1.18	1.13	1.34	2.55	2.78	1.25	1.97
	ERROR	54.8	50.7	40.0	41.4	38.3	72.7	69.1

WAVE SPECTRA USED WERE:

1 = SAN FRANCISCO BAY (FIG.4 OF REF. 15) AAP=2.10S. HS=0.737 FT.
2 = SAN FRANCISCO BAY (FIG.3 OF REF. 15) AAP=2.86 S HS=0.963 FT.
3 = MARBLEHEAD,OHIO (FIG. C-10 OF REF. 2) AAP=2.25 S. HS=0.296 M.
4 = CHESAPEAKE BAY (FIG. E-3 OF REF. 2) AAP=2.12 S. HS=0.498 M.
5 = MIAMI,FLORIDA (FIG.G-3 OF REF. 2) AAP=2.23 S. HS=0.570 M.
6 = FORT PICKENS (FIG.H-10 OF REF. 2) AAP=4.31 S. HS=0.98 M.
7 = FORT PICKENS,FLORIDA (FIG.H-3 OF REF. 2) AAP=4.91 S. HS=1.73 M.

AAP=Average Apparent Period
HS=Significant Wave Height

Table 8b. SIGNIFICANT RELATIVE TRANSOM MOTION (FEET)

SPECTRUM		1	2	3	4	5	6	7
		-----	-----	-----	-----	-----	-----	-----
HS (FT.)		.74	.96	.98	1.69	1.92	3.20	5.69
TEST NO.								
2000	THEORY	1.67	1.57	1.73	3.30	3.52	2.03	3.11
	EXPER.	.79	.61	.89	1.69	1.64	.60	1.05
	ERROR	112.2	159.1	94.4	95.4	114.8	236.0	195.7
2100	THEORY	1.67	1.57	1.73	3.30	3.52	2.03	3.11
	EXPER.	.81	.59	.91	1.69	1.63	.55	1.02
	ERROR	107.0	168.2	90.2	94.7	115.6	268.8	204.6
2200	THEORY	1.97	2.07	2.08	3.87	4.45	2.77	4.06
	EXPER.	1.55	1.30	1.61	3.07	3.12	1.50	2.52
	ERROR	27.6	58.4	29.4	26.2	42.7	83.8	61.4
2300	THEORY	1.40	1.14	1.45	2.87	2.77	1.35	2.24
	EXPER.	1.35	.94	1.53	3.00	2.74	.67	1.47
	ERROR	3.8	21.6	5.3	4.3	1.1	102.2	52.1
2400	THEORY	1.47	1.22	1.52	3.02	2.93	1.45	2.39
	EXPER.	.82	.57	1.00	1.92	1.78	.46	.89
	ERROR	79.3	112.5	52.5	57.6	65.1	215.7	169.4
2500	THEORY	1.93	1.64	1.97	3.91	3.86	1.99	3.24
	EXPER.	1.22	.92	1.38	2.76	2.56	.82	1.54
	ERROR	57.7	77.7	42.9	41.9	50.6	142.0	109.7
2600	THEORY	1.95	1.96	2.03	3.79	4.25	2.60	3.85
	EXPER.	1.27	1.03	1.43	2.81	2.70	1.08	1.79
	ERROR	53.7	90.0	42.2	35.0	57.4	140.1	114.9
2700	THEORY	2.06	1.92	2.11	4.01	4.29	2.48	3.80
	EXPER.	1.65	1.25	1.85	3.70	3.43	.97	1.91
	ERROR	24.5	54.1	14.1	8.4	25.2	156.7	99.6
2800	THEORY	2.63	2.25	2.84	5.58	5.51	2.67	4.25
	EXPER.	1.85	1.43	2.05	4.11	3.83	1.19	2.26
	ERROR	41.7	57.2	38.5	35.9	43.8	123.9	87.6

WAVE SPECTRA USED WERE:

1 = SAN FRANCISCO BAY (FIG.4 OF REF.15)	AAP=2.1S.	HS=0.737 FT.
2 = SAN FRANCISCO BAY (FIG.3 OF REF.15)	AAP=2.8 S	HS=0.963 FT.
3 = MARBLEHEAD,OHIO (FIG. C-10 OF REF. 2)	AAP=2.25 S.	HS=0.296 M.
4 = CHESAPEAKE BAY (FIG. E-3 OF REF. 2)	AAP=2.12 S.	HS=0.498 M.
5 = MIAMI,FLORIDA (FIG.G-3 OF REF. 2)	AAP=2.23 S.	HS=0.570 M.
6 = PORT PICKENS (FIG.H-10 OF REF. 2)	AAP=4.31 S.	HS=0.98 M.
7 = PORT PICKENS,FLORIDA (FIG.H-3 OF REF.2)	AAP=4.91 S.	HS=1.73 M.

AAP=Apparent Average Period
HS =Significant Wave Height

4.3 PREDICTION OF EXPECTED NUMBER OF SWAMPINGS PER HOUR

The expected number of swampings per hour, denoted ENOS, is computed for the boats "as built", as well as for hypothetical boats having the freeboards increased by 2, 4, 6 and 8 inches from the original, respectively.

The range of the freeboard increase of [0., 8.] inches is considered to cover the entire range of interest. If the freeboard needed to be increased more than 8 inches, it would imply a major and impractical redesign of the boats.

These results are plotted in Figures 51 through 57 in the following manner. Each Figure consists of four pages showing all 18 loading conditions in sequence, for one only wave spectrum. This presentation allows evaluation of how different boats in different loading conditions fare in the same wave condition. The ENOS values are shown on a logarithmic scale, plotted versus the increase in freeboard (above the original value), f. Both theoretical and experimental results are shown. The following test parameters are shown below the plot frames, for convenience:

freeboard, as tested, feet
boat
load , written in the same shorthand notation as before

The following conclusions are drawn from these results.

1) The experimental results indicate that the number of swampings is indeed high, in many cases being greater than 10 per hour, with several cases greater than 1000 per hour. (Since the average wave periods are about 2-4 seconds, this means that a swamping occurs in practically every cycle !). This confirms the basic premise of this study, namely that the swamping accidents are loading related and that the boats are unsafe in the wave conditions studied.

2) Boats heavily loaded at either end experience larger ENOS than boats with a more symmetric loading, as expected.

4.4 REQUIRED INCREASE IN FREEBOARD

It is convenient to discuss the remaining results with a different set of plots, obtained by cross-plotting the curves of ENOS-versus-freeboard increase at constant ENOS values. Two values are selected, of ENOS=1 and 0.01. It should be remembered that loading conditions studied here represent rather extreme cases. For example, two men sitting on the aft thwart of a 2-man boat might represent a case where both are working on a motor or are trying to free the anchor. Such loadings would not last a long time, say, not more than 15 minutes. This gives four such time periods in an hour. Thus the ENOS of 1 gives, on the average, one swamping in four occurances of the loadings/wave combinations. Such value may be considered as the critical limit. The other ENOS value (0.01) reduces this chance by a factor of 100, thus it can be safely considered as a very high level of safety.

Eighteen Figures, numbered 58 through 75, show these results in the form of histograms. Each Figure shows one tested load case in all seven wave conditions. The left frame in each Figure shows the results for ENOS=1 and the right frame for 0.01. Both theoretical and experimental results are displayed in both frames. For convenience, the relevant parameters are listed above and below the plots.

The results are reviewed on a boat-by-boat basis, individually for the stern and head wave cases. The experimental results are reviewed first.

13.5-ft. Jonboat in Stern Waves, (Figures 58,59,60)

The original stern freeboard in these conditions varies from 0.54 to 0.88 feet. Wave conditions 4 and 5 require an increase of freeboard in excess of 8 inches, even at ENOS of 1. The remaining wave cases require an increase of from 3 to 7.9 inches.

13.5-ft. Jonboat in Head Waves, (Figure 61)

The bow freeboard is now only 0.45 feet. All wave conditions, even at ENOS=1, require an increase of freeboard in excess of 8 inches.

8-ft. Dinghy in Stern Waves , (Figures 62 and 63)

The freeboard varies from 0.73 to o.74 feet. Wave conditions 4 and 5 require the freeboard increase of more than 8 inches at ENOS=1. At ENOS=0.01 so does the wave condition 3.

8-ft. Dinghy in Head Waves. (Figure 64)

The freeboard is relatively large of 0.96 feet. The boat is floating almost at even keel. Even in this moderate load condition the wave conditions 4 and 5 require increasing the freeboard by between 5 and 8 inches.

14-ft. Jonboat in Stern Waves. (Figure 65)

The freeboard is now 0.64 feet. Most wave conditions require large increases of freeboard.

14-ft Jonboat in Head Waves. (Figure 66)

The freeboard is now only 0.38 feet, and in all wave cases the freeboard increase exceeeds 8 inches.

15.3-ft. Runabout in Stern Waves. (Figures 67 and 68)

Unlike the jonboats, the runabout appears to be a more seaworthy vessel, due to its higher freeboard when floating at equal keel. However, even this boat is subjected to a dramatic reduction of the freeboard when it is loaded at the stern. In the present case of three persons sitting at the stern and two amidships, with motor and gear, the freeboard is between 0.60 and 0.62 feet, which is similiar to that of jonboats. The results indicate that even for this boat the freeboard would need to be increased significantly (over 8 inches) to yield ENOS=0.01.

15.3-ft. Runabout in Head Waves. (Figure 69)

The freeboard is now 0.47 feet, which is significantly lower than in the stern load case. All wave conditions would require the freeboard to increase in excess of 8 inches.

12.125-ft. Skiff in Stern Waves. (Figures 70 and 71)

The aft portion of the skiff looks similiar to the jonboats. The freeboard in the stern load cases was between 0.53 and 0.81 feet. The required increase in freeboard exceeds 8 inches in most of the wave conditions.

12.125-ft. Skiff in Head Waves. (Figure 72)

The freeboard has the relatively high value of 1 foot. At ENOS of 1, the required increase of the freeboard is 2.5 inches for all wave conditions except conditions 4 and 5.

At ENOS of 0.01, the freeboard increase reaches 8 inches or more.

15.833-ft. Dory in Stern Waves. (Figures 73 and 74)

The dory boat tested here is an old specimen made of wood, of the classical New England design. These boats are reputed to be very seaworthy. The present results do not support this fame. In stern waves, with the freeboard being between 0.85 and 0.70 feet, the 'required' increase of the freeboard still exceeds 8 inches in many wave cases. A likely explanation of this contradiction is that the swamping, as defined in this work, would be less dangereous on the pointed bow/stern dory than on the wide-transom jonboats, runabouts or skiffs. Furthermore, the end-load condition assumed for the dory would be very rare in real life, again due to the boat shape (narrow ends) while it would be quite possible on the other boat types.

15.833-ft. Dory in Head Waves. (Figure 75)

The dory boat is almost symmetrical Fore and Aft, therefore it is not surprising that the bow load case turned out to be similiar to the stern load one.

4.5 ERROR OF THEORETICAL PREDICTIONS

One of the most important questions addressed in the present phase of the project is, "How good are the results based on the RAO's computed by the program HANSEL?". This Section compares the theoretical and experimental results.

There is a significant number of load and wave cases where the two results are almost identical, thus suggesting that the strip theory, although not intended for such beamy boats, may still yield good results. However, there is also a large number of cases where the theory is completely wrong (e.g., test 2000, wave spectrum=2, ENOS=1, where the theory predicts over 8 inches of the freeboard increase, while actually there is none).

It was hoped that it might be possible to establish the lower bound of values of the effective length-to-beam ratio where the strip theory would be valid. Unfortunately, the present results disqualify this supposition. For example, the dory boat, test 2600, has effective length/beam ratio equal to 4.08, it has no transom and it is the most "ship-like" boat of the entire series. One could expect that for this case the theory would work the best. It turned out that it was quite poor. It is necessary to point out that we mean here the predictions of the transom motion relative to the water level at the transom, rather than the heave and pitch motions. The latter are predicted fairly well in most cases, but due to the diffraction phenomenon, the knowledge of them is not sufficient to predict accurately the transom relative motion.

These disappointing results apply to all boat types studied. Altghough the theory seems to work better for jonboats than for the other boat types, the discrepancies are large enough for all boat types to conclude that the linear strip theory in general, and the program HANSEL in particular, is not suited for the present safeloading work.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The present results are preliminary. They indicate that no small correction to the freeboard would make the boats safe in waves if certain extreme load distributions were to be tolerated. In order to make the boats safe in waves, without changing the present Level Floatation regulation, the freeboard would need to be increased by close to 100 %, and often even more, and this does not appear practical. Therefore one potential solution to the problem is to require a warning plate on the boats stating that the boats as built can be inherently unsafe in waves in most asymetrical loading conditions, and to leave the rest to the boatman. In other words, one solution to the problem is to discourage use of the boats in any conditions other than almost dead calm waters.

The present results indicate that loading conditions resulting in even keel are significantly less dangereous than the extreme loads, and that the probability of swamping decreases to tolerable levels in all but the most extreme wave conditions. This suggests that an improvement in safety may be accomplished by joint requirements of level loading, perhaps some minor increase in freeboard, and perhaps some limitation on the useage in extreme wave conditions. The present data base is not sufficient to discuss the requirements quantitatively. Several major studies would need to be performed first, as follows.

In order to assure even keel loading, the internal arrangements of the boats would need to be altered. Possibly, structures such as railings or hand-holds which make human access to the boat ends difficult would have to be required. This step may require changes of the present Level Floatation regulation.

Contrary to the open-water waves, the wave spectra on smaller basins are subject to a great varability due to local conditions of the land and bottom topography, wind, current and wave refraction, other boat activity, as well as fetch and duration. For this reason it is difficult to define some "typical" wave spectra. This subject requires additional study, and possibly some field measurements of waves. It is pointed out that such measurements are usually quite expensive. Conceivably, one could define a maximum envelope of all reasonable spectra, e.g. a white spectrum of sufficient magnitude and range to cover all reasonable cases, however, a careful trade-off must be performed between the realism of this approach and the realism of the probability of swamping. The present results make it clear that severe wave conditions result in the very high probability. Consideration would need to be given not only to the wind waves but also to the waves generated by other boats.

In order to study the motions in waves of various boats in arbitrary loading conditions, a reliable motion model would need to be determined. The feasibility of mathematical modelling of the motions has not yet been established. This report demonstrated that the motions are indeed linear but that the strip-theory is not suitable. The 3-D linear theory was shown to give promising results, but this needs to be confirmed by more extensive comparisons between the theory and the measured RAO's. Many of the tasks completed in the present study could be used directly with the 3-D theory, namely the offset pre-processor, computation of the motions at arbitrary points on the boats and all programs which predict the probability of swamping.

Once all three aspects of the problem, namely the changes in boat arrangements and loadings, specifications of extreme wave conditions, and motions simulations are completed and verified under actual field conditions, the task of drafting a regulation can be pursued. It is quite possible that it may lead to a regulation which would indeed save lives. However, the cost and effort of doing this may be high indeed.

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FIGURES

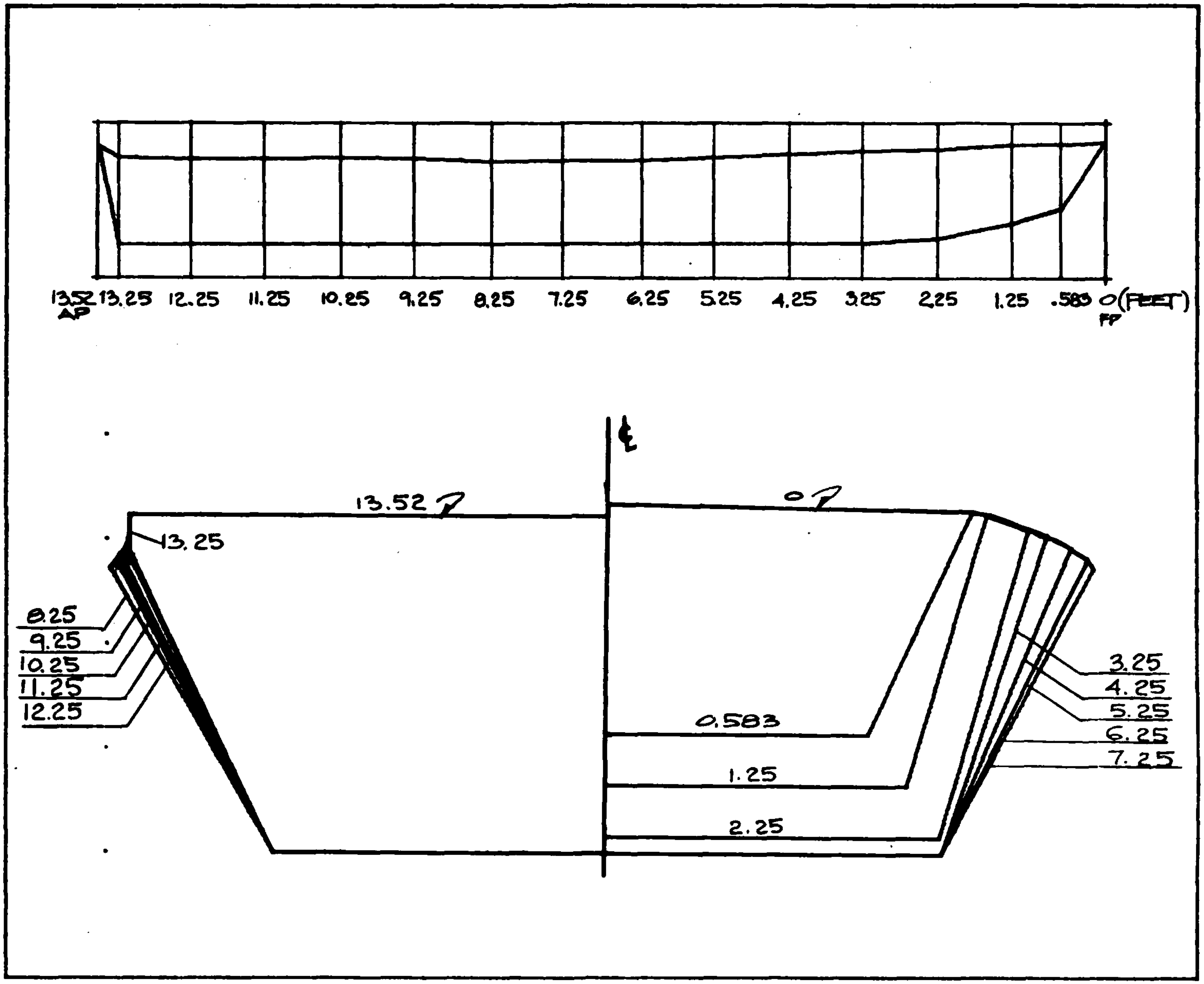

Figure 1. PROFILE AND BODY PLAN OF 13.5-FT. JONBOAT

TABLE OF OFFSETS OF 13.5 FT. JONBOAT

Distance from F.P. feet	Height feet	Half-Breadth feet
0.	1.333	1.000
0.583	0.458 1.312	0.000 1.400
1.250	0.260 0.260 1.302	0.000 1.146 1.458
2.250	0.063 0.063 1.240	0.000 1.271 1.615
3.250	0.000 0.000 1.219	0.000 1.281 1.688
4.250	0.000 0.000 1.177	0.000 1.281 1.781
5.25	0.000 0.000 1.135	0.000 1.281 1.844
6.25	0.000 0.000 1.094	0.000 1.281 1.865
7.25	0.000 0.000 1.094	0.000 1.281 1.875
8.25	0.000 0.000 1.083	0.000 1.281 1.906
9.25	0.000 0.000 1.124	0.000 1.281 1.875
10.25	0.000 0.000 1.135	0.000 1.281 1.875
11.25	0.000 0.000 1.125	0.000 1.281 1.865
12.25	0.000 0.000 1.125	0.000 1.281 1.833
13.25	0.000 0.000 1.146	0.000 1.281 1.833
13.52	1.292 1.292	0.000 1.833

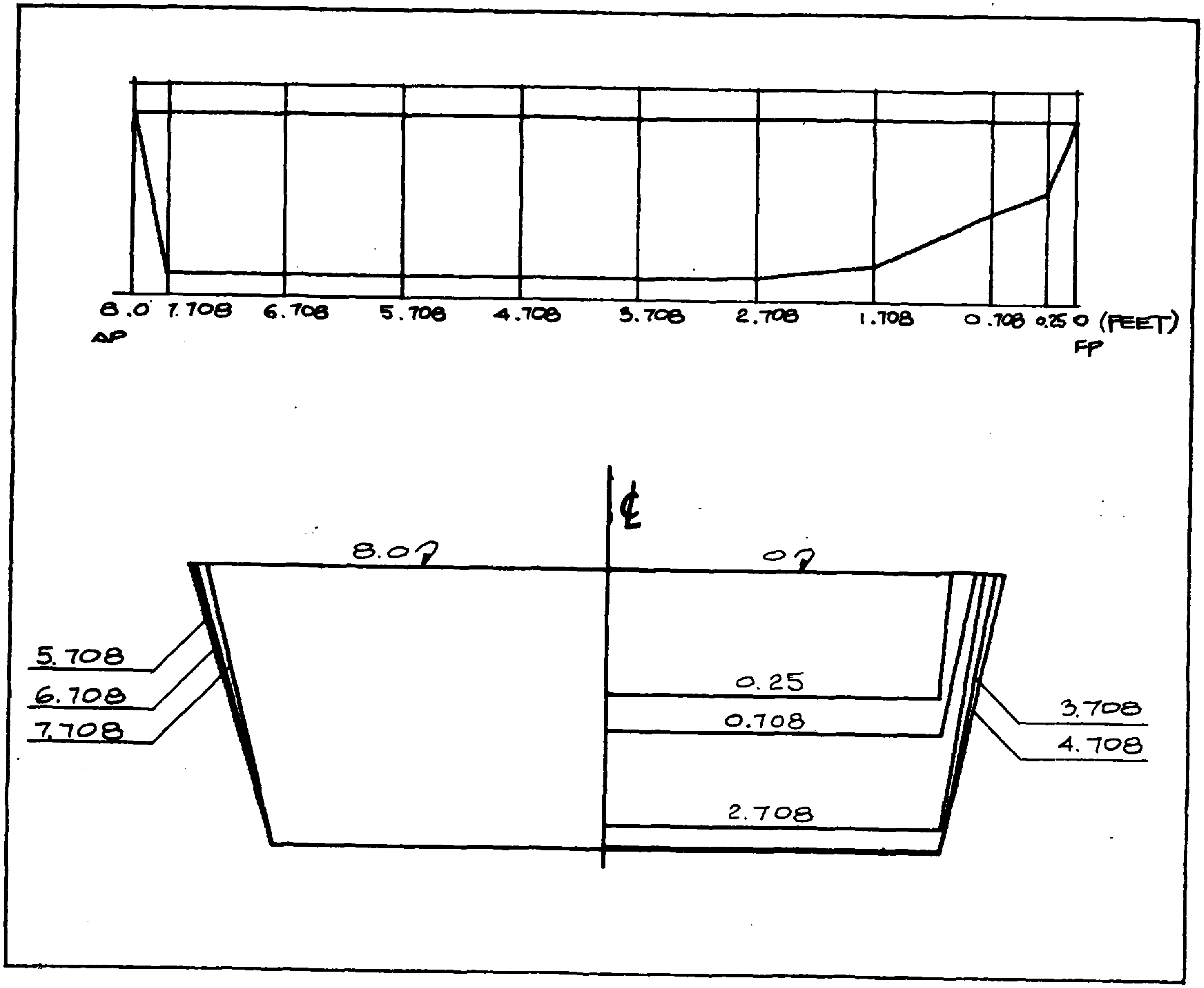

FIGURE 2. PROFILE AND BODY PLAN OF 8-FT. DINGHY

TABLE OF OFFSETS OF 8.00 FT JONBOAT

Distance from F.P. feet	Height feet	Half-Breadth feet
0.000	1.354	0.000
	1.354	1.600
0.250	0.750	0.000
	0.750	1.602
	1.354	1.660
0.708	0.573	0.000
	0.573	1.615
	1.354	1.781
1.708	0.115	0.000
	0.115	1.615
	1.354	1.823
2.708	0.010	0.000
	0.010	1.615
	1.354	1.875
3.708	0.000	0.000
	0.000	1.615
	1.350	1.917
4.708	0.000	0.000
	0.000	1.615
	1.354	1.948
5.708	0.000	0.000
	0.000	1.615
	1.354	2.000
6.708	0.000	0.000
	0.000	1.615
	1.354	2.021
7.708	0.000	0.000
	0.000	1.615
	1.354	2.031
8.000	1.354	0.000
	1.354	2.034

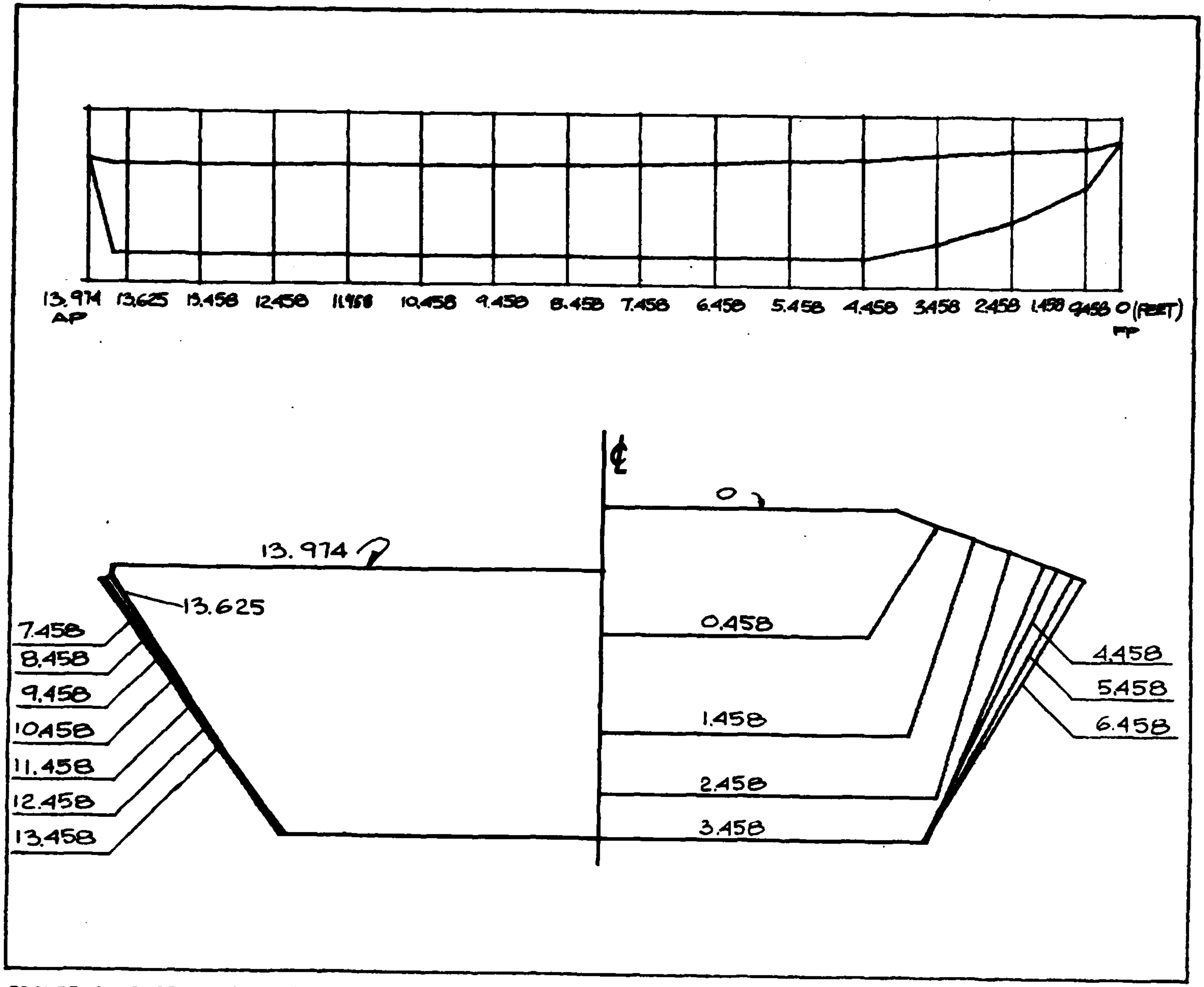

FIGURE 3. PROFILE AND BODY PLAN OF 14-FT. JONBOAT

TABLE OF OFFSETS OF 14 FT. JONBOAT

Distance from F.P. feet	Height feet	Half-Breadth feet
0.000	1.599	0.000
	1.599	1.417
0.458	0.984	0.000
	0.984	1.281
	1.500	1.599
1.458	0.510	0.000
	0.510	1.479
	1.464	1.792
2.458	0.214	0.000
	0.214	1.615
	1.406	1.964
3.458	0.000	0.000
	0.000	1.573
	1.339	2.125
4.458	0.000	0.000
	0.000	1.552
	1.323	2.193
5.458	0.000	0.000
	0.000	1.557
	1.286	2.266
6.458	0.000	0.000
	0.000	1.557
	1.266	2.323
7.458	0.000	0.000
	0.000	1.557
	1.245	2.375
8.458	0.000	0.000
	0.000	1.557
	1.234	2.380
9.458	0.000	0.000
	0.000	1.552
	1.229	2.406
10.458	0.000	0.000
	0.000	1.557
	1.229	2.422
11.458	0.000	0.000
	0.000	1.557
	1.224	2.432
12.458	0.000	0.000
	0.000	1.547
	1.224	2.427
13.458	0.000	0.000
	0.000	1.536
	1.224	2.432
13.625	0.000	0.000
	0.000	1.526
	1.224	2.432
13.974	1.292	0.000
	1.292	2.375

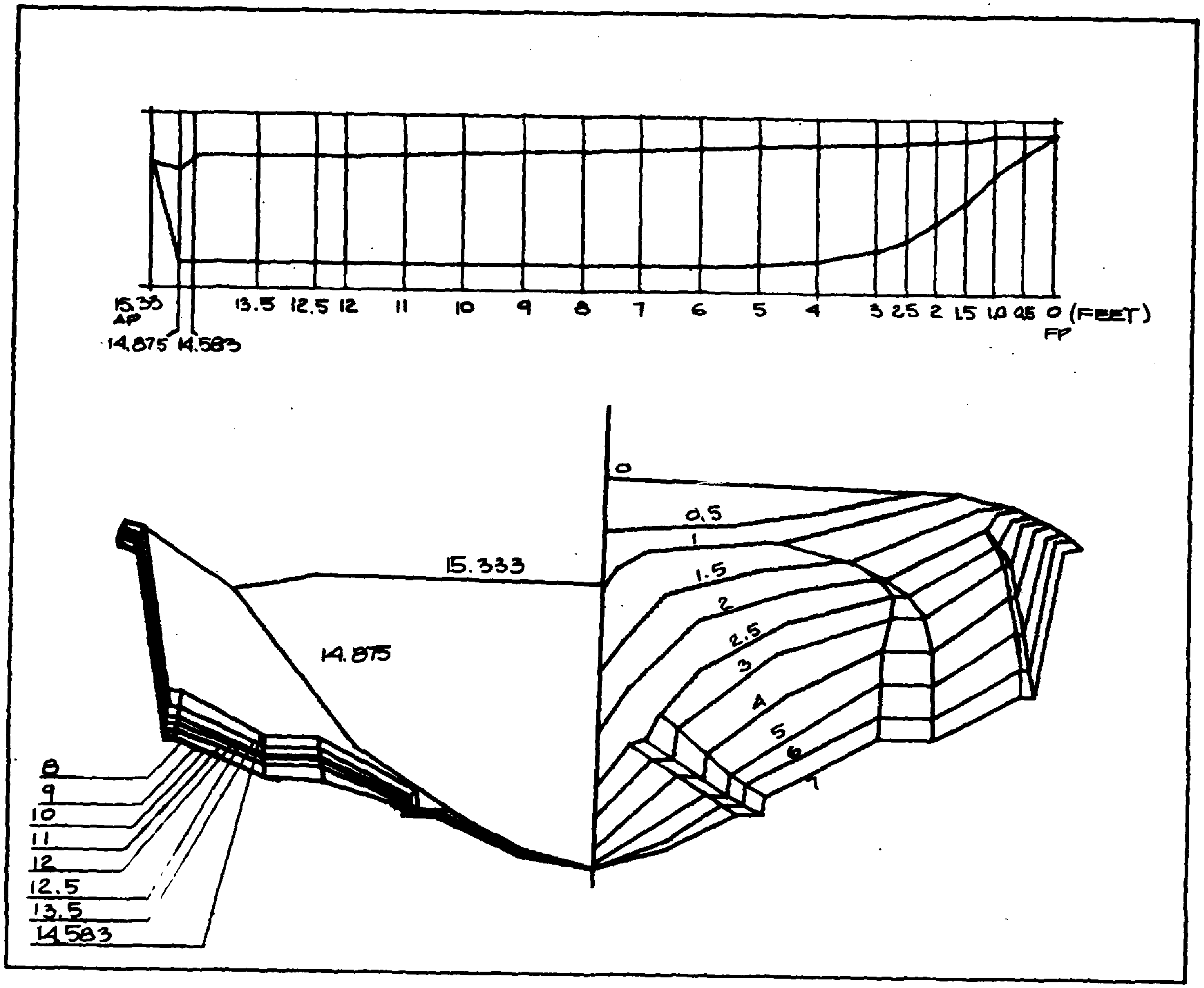

FIGURE 4. PROFILE AND BODY PLAN OF RUNABOUT BOAT

TABLE OF OFFSETS OF 15.33-ft. RUNABOUT

Distance from F.P. feet	Height feet	Half-Breadth feet
0.0	2.271	0.
	2.273	0.002
0.5	1.958	0.
	1.990	0.292
	2.021	0.75
	2.115	1.281
	2.198	1.583
	2.250	1.833
1.0	1.625	0.
	1.75	0.083
	1.854	0.260
	1.927	0.938
	1.928	1.031
	2.219	2.000
	2.250	2.060
1.5	1.146	0.
	1.323	0.125
	1.604	0.365
	1.760	0.896
	1.833	1.365
	1.834	1.438
	2.166	2.177
	2.177	2.300
2.0	0.792	0.000
	1.052	0.166
	1.458	0.563
	1.656	1.156
	1.729	1.562
	1.730	1.635
	2.042	2.208
	2.135	2.281
	2.156	2.395
2.5	0.479	0.000
	0.729	0.186
	0.760	0.280
	0.890	0.340
	1.177	0.583
	1.469	1.083
	1.646	1.688
	1.647	1.771
	1.948	2.260
	1.949	2.281
	2.104	2.360
	2.135	2.458
3.0	0.302	0.000
	0.646	0.313
	0.656	0.437
	0.833	0.458
	1.281	1.021
	1.521	1.698
	1.522	1.865

3 continued	1.844 1.845 2.083 2.104	2.323 2.365 2.417 2.531
4.0	0.115 0.551 0.553 0.687 1.042 1.323 1.324 1.656 1.657 2.052 2.080	0.000 0.460 0.625 0.635 1.094 1.635 1.927 2.365 2.406 2.500 2.583
5.0	0.031 0.448 0.449 0.573 1.135 1.136 1.448 1.449 2.010 2.042	0.000 0.625 0.760 0.771 1.625 1.938 2.396 2.448 2.563 2.650
6.0	0.000 0.177 0.396 0.397 0.520 0.938 0.939 1.240 1.241 1.990 2.000	0.000 0.417 0.729 0.854 0.865 1.625 1.938 2.438 2.490 2.615 2.720
7.0	0.000 0.125 0.344 0.345 0.448 0.813 0.814 1.083 1.084 1.927 1.958	0.000 0.417 0.823 0.969 0.979 1.625 1.938 2.438 2.521 2.667 2.771
8.0	0.000 0.094 0.312 0.313 0.417 0.708 0.709 0.958	0.000 0.417 0.865 1.031 1.042 1.625 1.938 2.437

8 continued	0.959 1.896 1.927	2.510 2.677 2.780
9.0	0.000 0.083 0.292 0.293 0.385 0.646 0.647 0.865 0.866 1.850 1.896	0.000 0.417 0.896 1.073 1.083 1.625 1.938 2.448 2.500 2.708 2.813
10.0	0.000 0.073 0.281 0.282 0.375 0.594 0.595 0.802 0.803 1.833 1.865	0.000 0.417 0.917 1.094 1.115 1.625 1.938 2.448 2.510 2.719 2.818
11.0	0.000 0.063 0.271 0.272 0.365 0.573 0.574 0.760 0.761 1.802 1.833	0.000 0.417 0.927 1.115 1.115 1.625 1.938 2.448 2.521 2.719 2.823
12.	0.000 0.052 0.271 0.272 0.354 0.542 0.543 0.729 0.730 1.760 1.792	0.000 0.417 0.927 1.125 1.125 1.625 1.938 2.448 2.521 2.719 2.823
12.5	0.000 0.052 0.271 0.396 0.542 0.543 0.719 0.720	0.000 0.417 0.927 1.250 1.625 1.938 2.448 2.521

12.5 continued	1.751 1.792	2.719 2.823
13.5	0.000 0.052 0.271 0.469 0.677 0.688 1.751 1.792	0.000 0.417 0.927 1.938 2.448 2.521 2.719 2.823
14.583	0.000 0.052 0.271 0.469 0.667 0.668 1.751 1.792	0.000 0.417 0.927 1.938 2.448 2.521 2.719 2.823
14.875	0.000 0.052 0.667 1.560	0.000 0.417 1.417 2.150
15.333	1.656 1.658	0.000 1.396

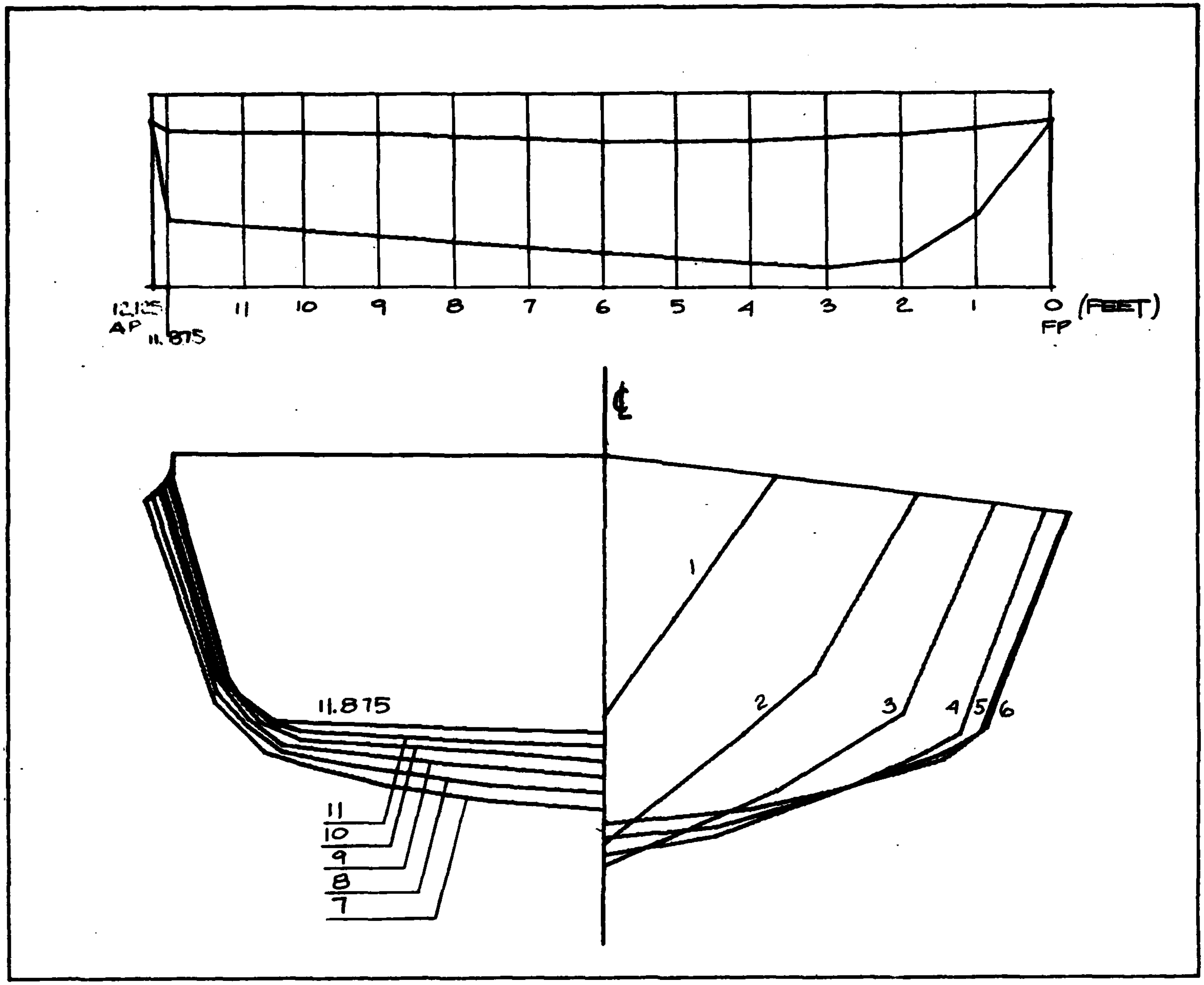

FIGURE 5. PROFILE AND BODY PLAN OF SKIFF

TABLE OF OFFSETS OF 12.125-FT. SKIFF

Distance from F.P. feet	Height feet	Half-Breadth feet
0.	1.969	0.000
	1.970	0.001
1.0	0.719	0.000
	1.860	0.820
2.0	0.104	0.000
	0.635	0.667
	0.927	1.010
	1.781	1.500
3.0	0.000	0.000
	0.365	0.833
	0.740	1.438
	1.740	1.875
4.0	0.052	0.000
	0.146	0.542
	0.396	1.208
	0.552	1.542
	0.646	1.708
	1.688	2.104
5.0	0.135	0.000
	0.187	0.542
	0.333	1.042
	0.542	1.625
	0.646	1.802
	1.688	2.219
6.0	0.202	0.000
	0.254	0.542
	0.275	0.719
	0.369	1.125
	0.515	1.625
	0.671	1.833
	1.692	2.229
7.0	0.271	0.000
	0.312	0.542
	0.385	1.042
	0.490	1.458
	0.542	1.625
	0.781	1.865
	1.729	2.198
8.0	0.352	0.000
	0.383	0.542
	0.477	1.208
	0.540	1.542
	0.660	1.708
	0.821	1.854
	1.760	2.167
9.0	0.427	0.000
	0.490	0.792
	0.573	1.542
	0.700	1.708
	0.890	1.854
	1.802	2.135

10.0	0.502 0.544 0.596 0.680 0.900 1.815	0.000 0.542 1.458 1.650 1.840 2.120
11.0	0.577 0.590 0.640 0.680 0.860 1.830	0.000 0.542 1.458 1.600 1.800 2.090
11.875	0.644 0.654 0.690 0.820 0.900 1.852	0.000 0.500 1.583 1.750 1.800 2.073
12.125	1.969 1.970	0.000 2.060

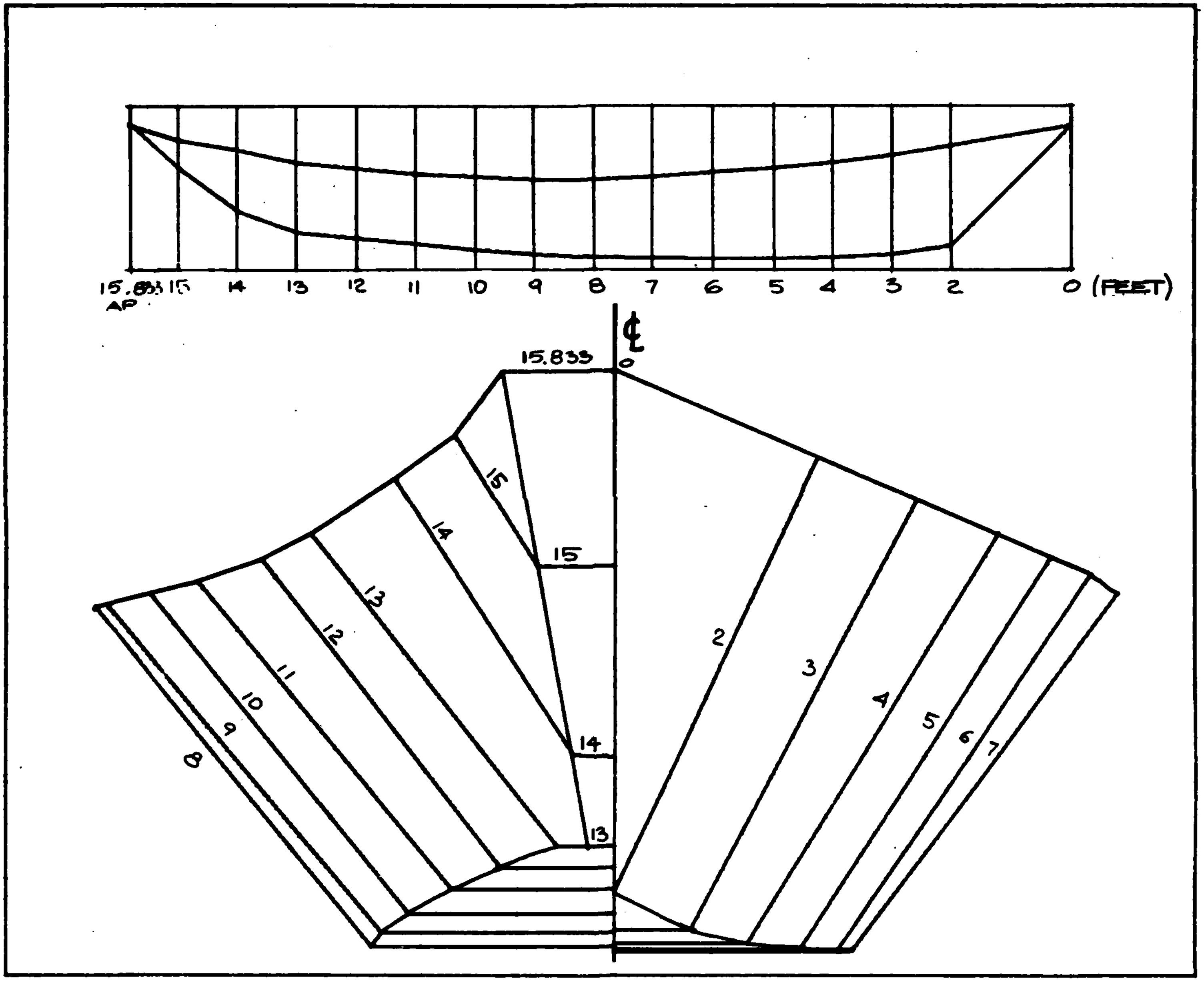

FIGURE 6. PROFILE AND BODY PLAN OF DORY

TABLE OF OFFSETS OF 15.833-FT. DORY

Distance from F.P. feet	Height feet	Half-Breadth feet
0.	2.229	0.000
	2.230	0.010
2.0	0.229	0.000
	1.896	0.792
3.0	0.083	0.000
	0.084	0.292
	1.729	1.167
4.0	0.031	0.000
	0.032	0.510
	1.604	1.479
5.0	0.000	0.000
	0.001	0.708
	1.506	1.677
6.0	0.000	0.000
	0.001	0.854
	1.448	1.833
7.0	0.010	0.000
	0.011	0.917
	1.375	1.938
8.0	0.021	0.000
	0.022	0.938
	1.323	1.990
9.0	0.073	0.000
	0.074	0.896
	1.323	1.938
10.0	0.145	0.000
	0.146	0.792
	1.375	1.781
11.0	0.240	0.000
	0.241	0.625
	1.417	1.594
12.	0.323	0.000
	0.324	0.438
	1.510	1.354
13.0	0.406	0.000
	0.407	0.219
	1.600	1.160
14.0	0.750	0.000
	0.760	0.156
	1.813	0.833
15.0	1.479	0.000
	1.480	0.292
	1.980	0.604
15.833	2.229	0.000
	2.230	0.417

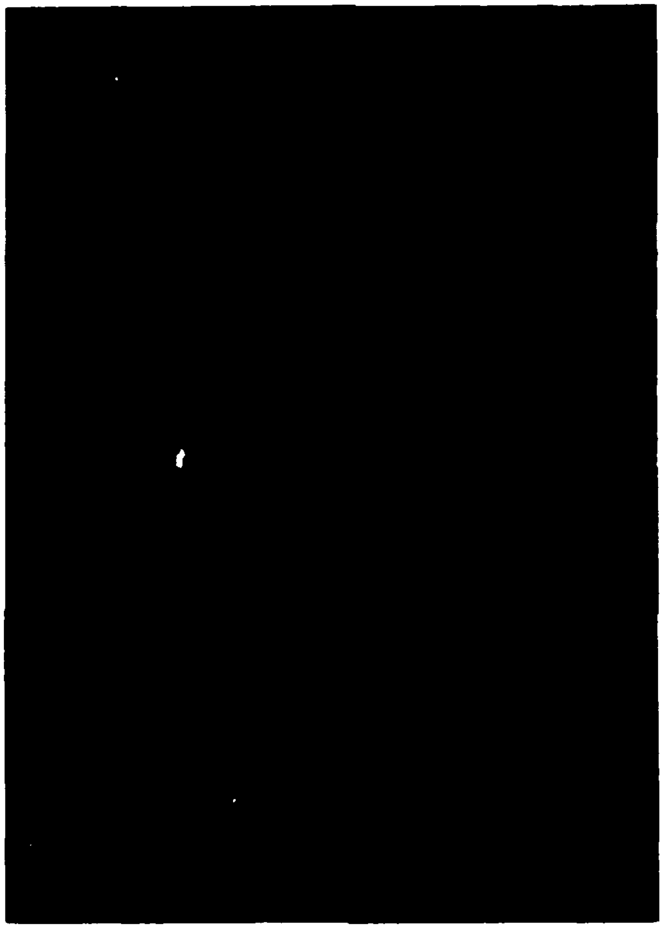

Figure 7. Motion Sensor Transducer (MST) Installation

Figure 8. 13.5-foot Jonboat in Position for Testing

Figure 9. 8-foot Dinghy in Position for Testing

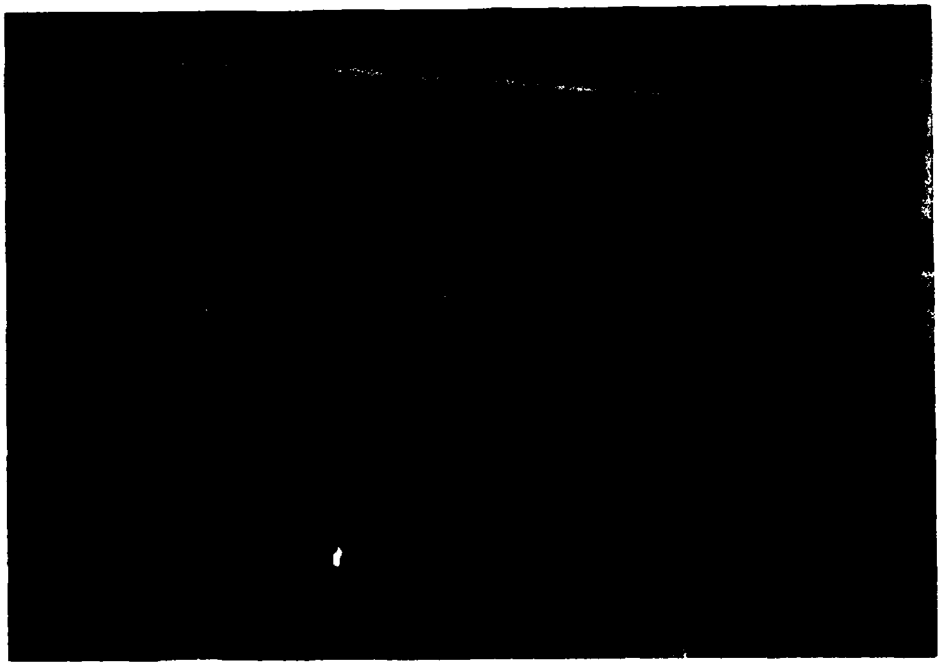

Figure 10. 14-foot Jonboat in Position for Testing

Figure 11. Runabout in Position for Testing

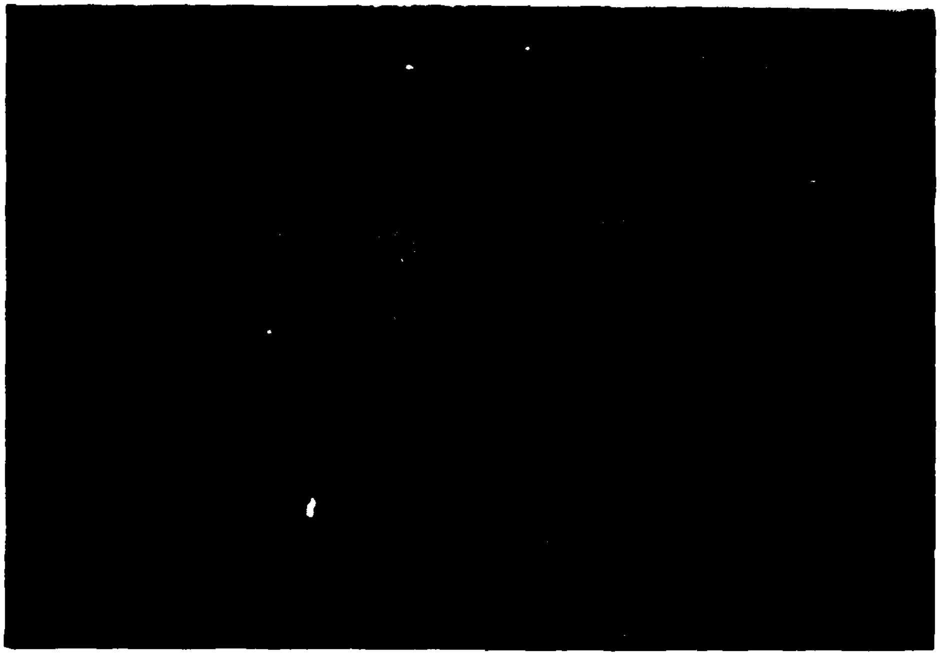

Figure 12. Skiff in Position for Testing

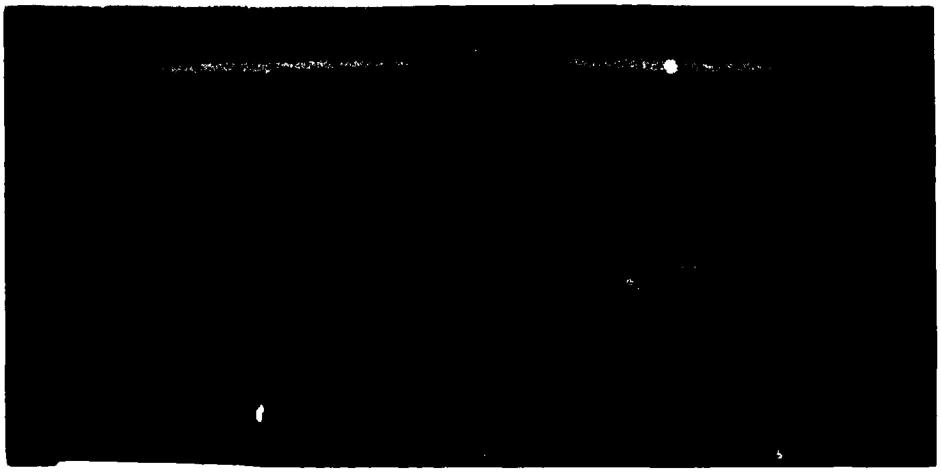

Figure 13. Dory in Position for Testing

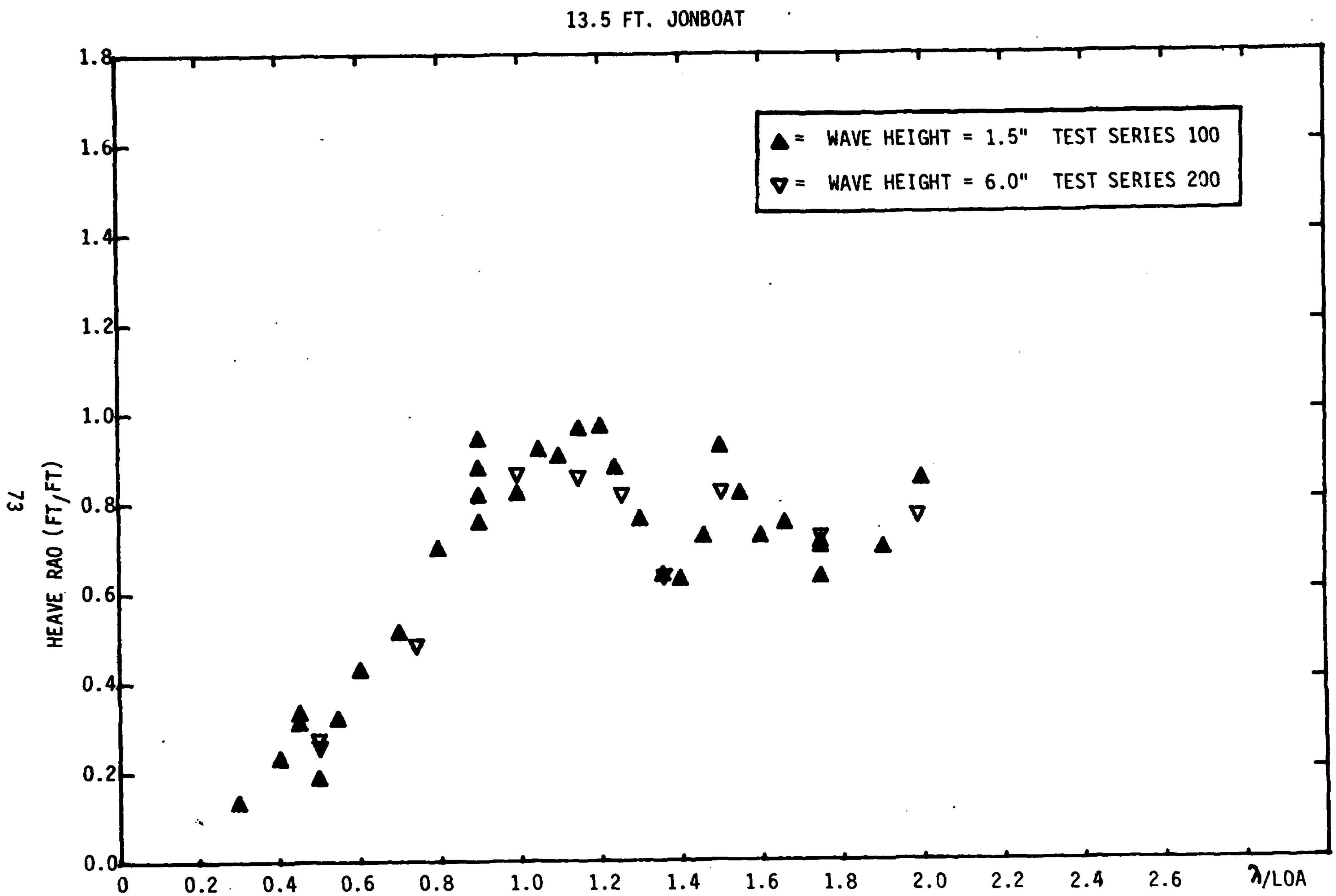

Figure 14a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

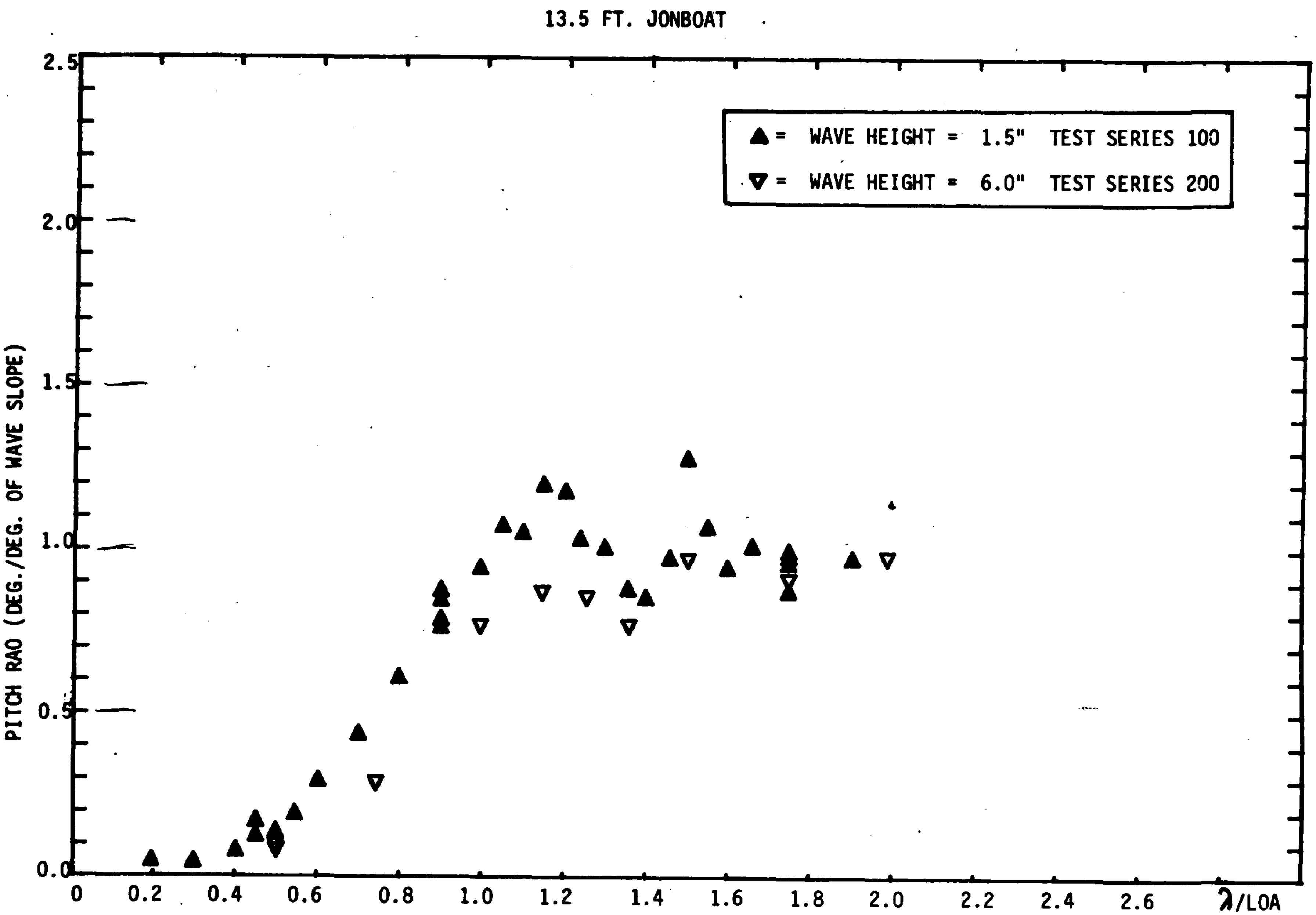

Figure 14b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

13.5 FT. JONBOAT

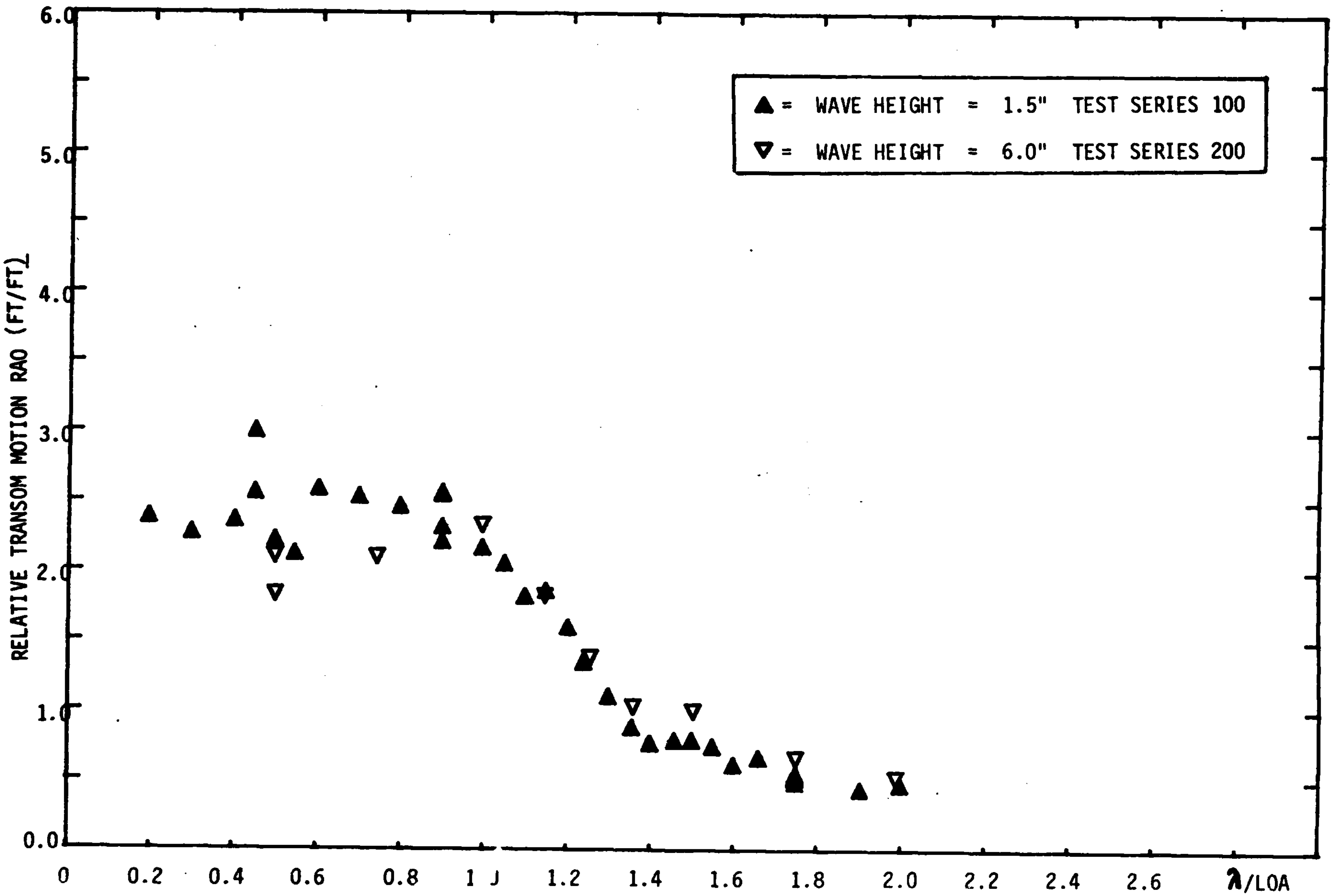

Figure 14c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

13.5 FT. JONBOAT

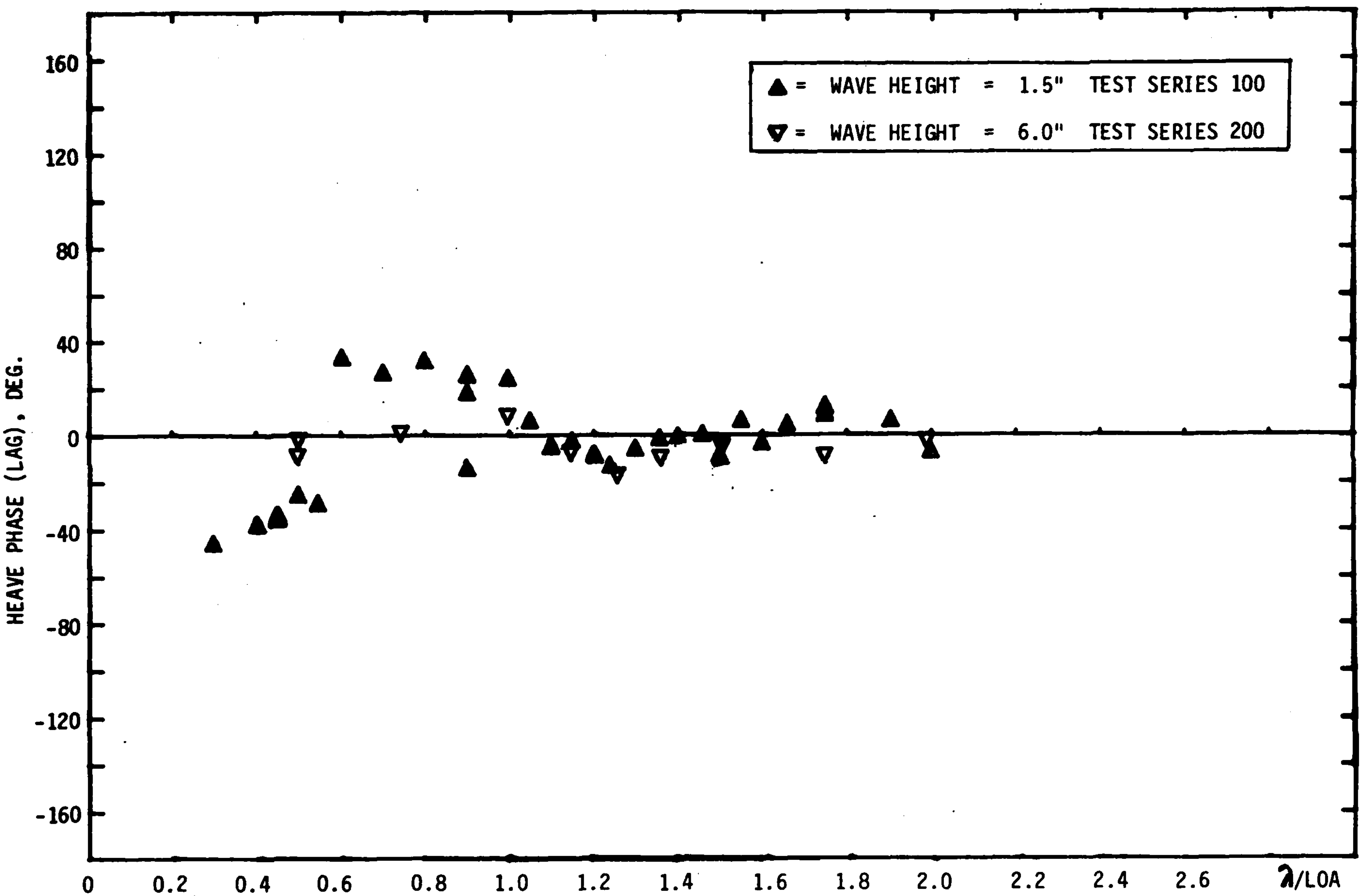

Figure 14d. HEAVE PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

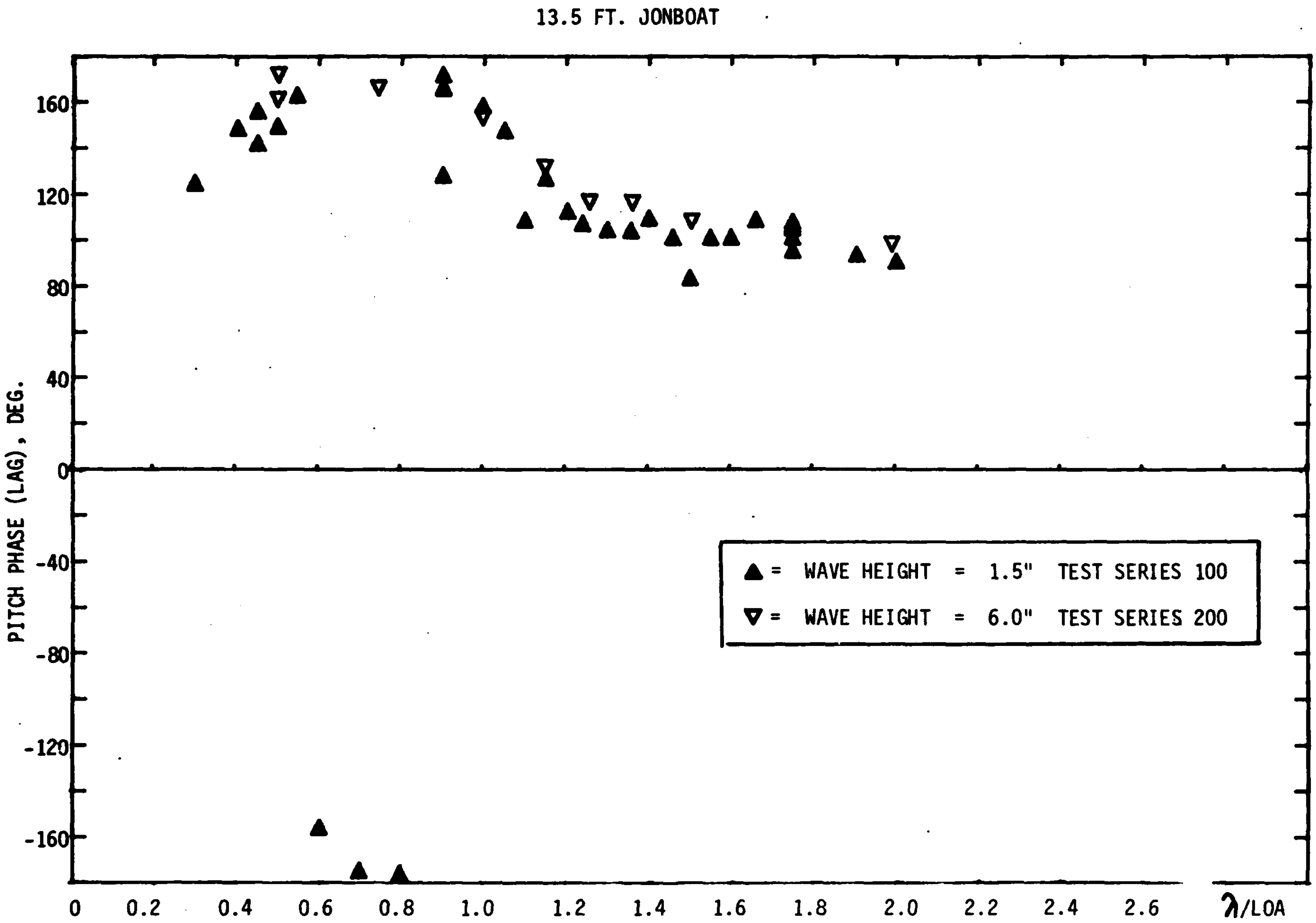

Figure 14e. PITCH PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

13.5 FT. JONBOAT

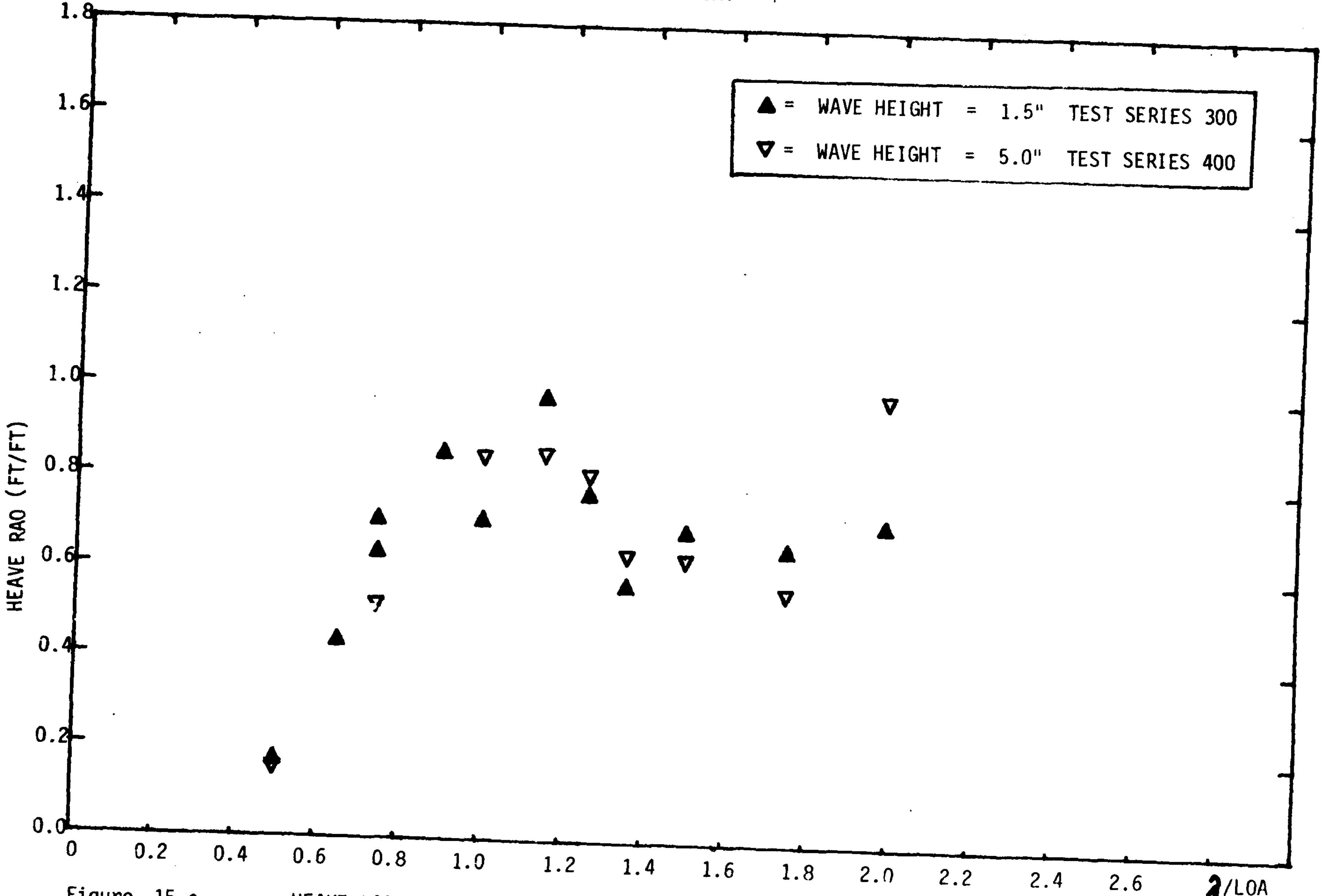

Figure 15 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT

13.5 FT. JONBOAT

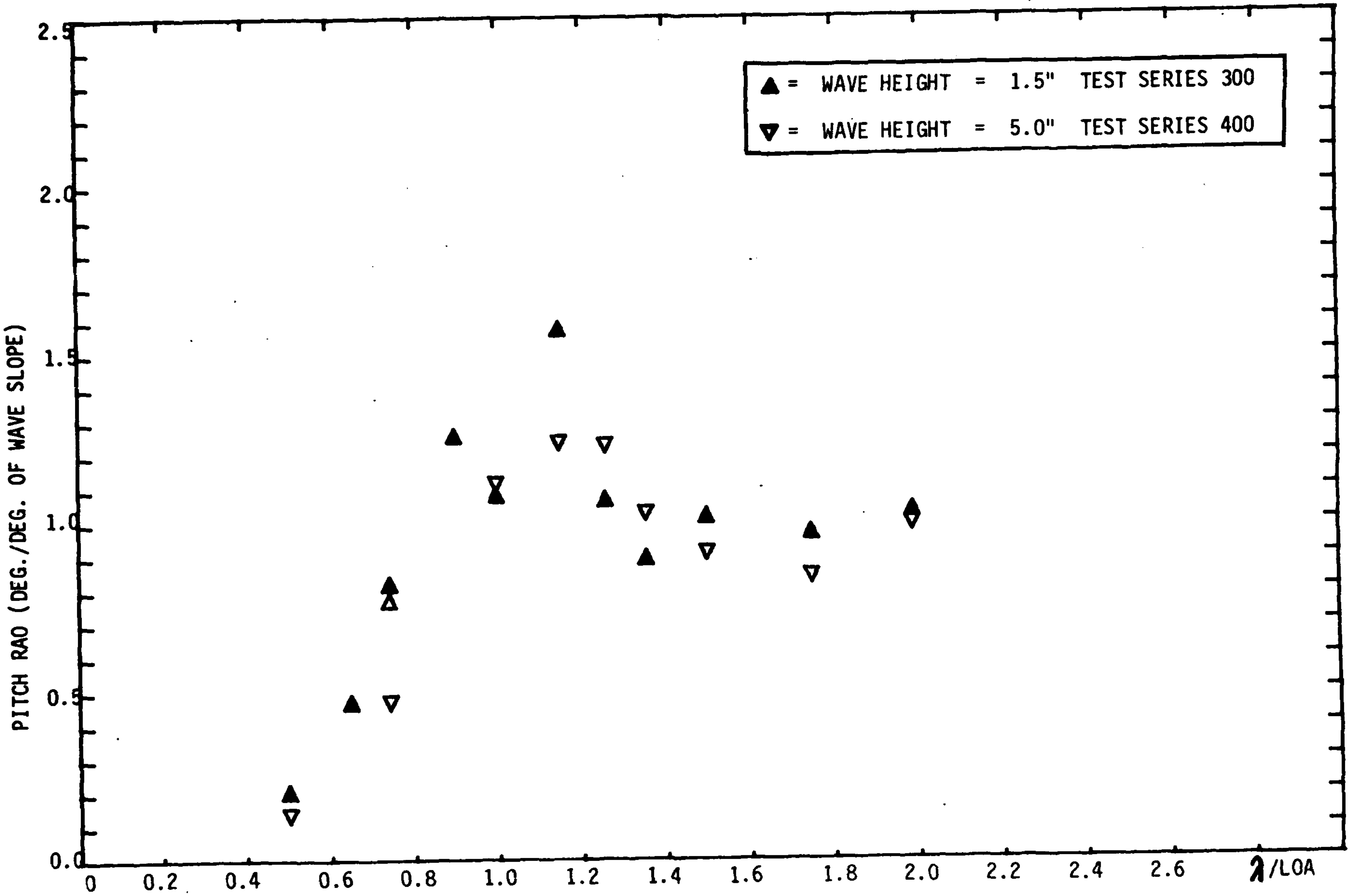

Figure 15 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT

AD-A131 399 PREDICTION OF THE SWAMPING TENDENCIES OF RECREATIONAL BOATS(U) CASDE CORP TORRANCE CA B W OPENHEIM ET AL. JAN 82 USCG-D-22-83 DOT-CG-954284-A

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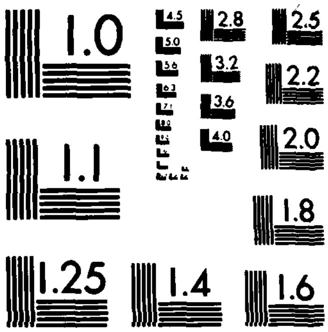

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

13.5 FT. JONBOAT

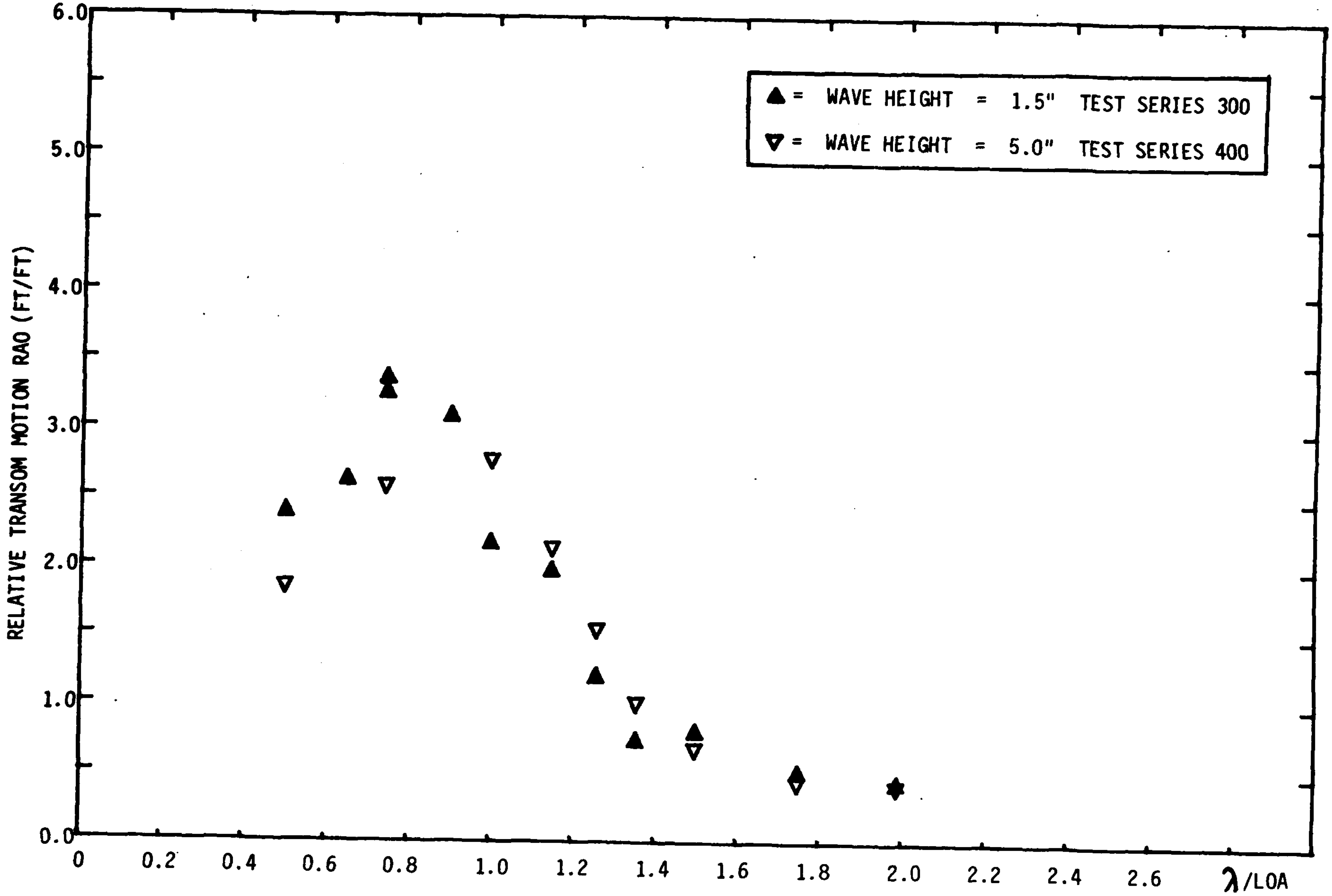

Figure 15 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT

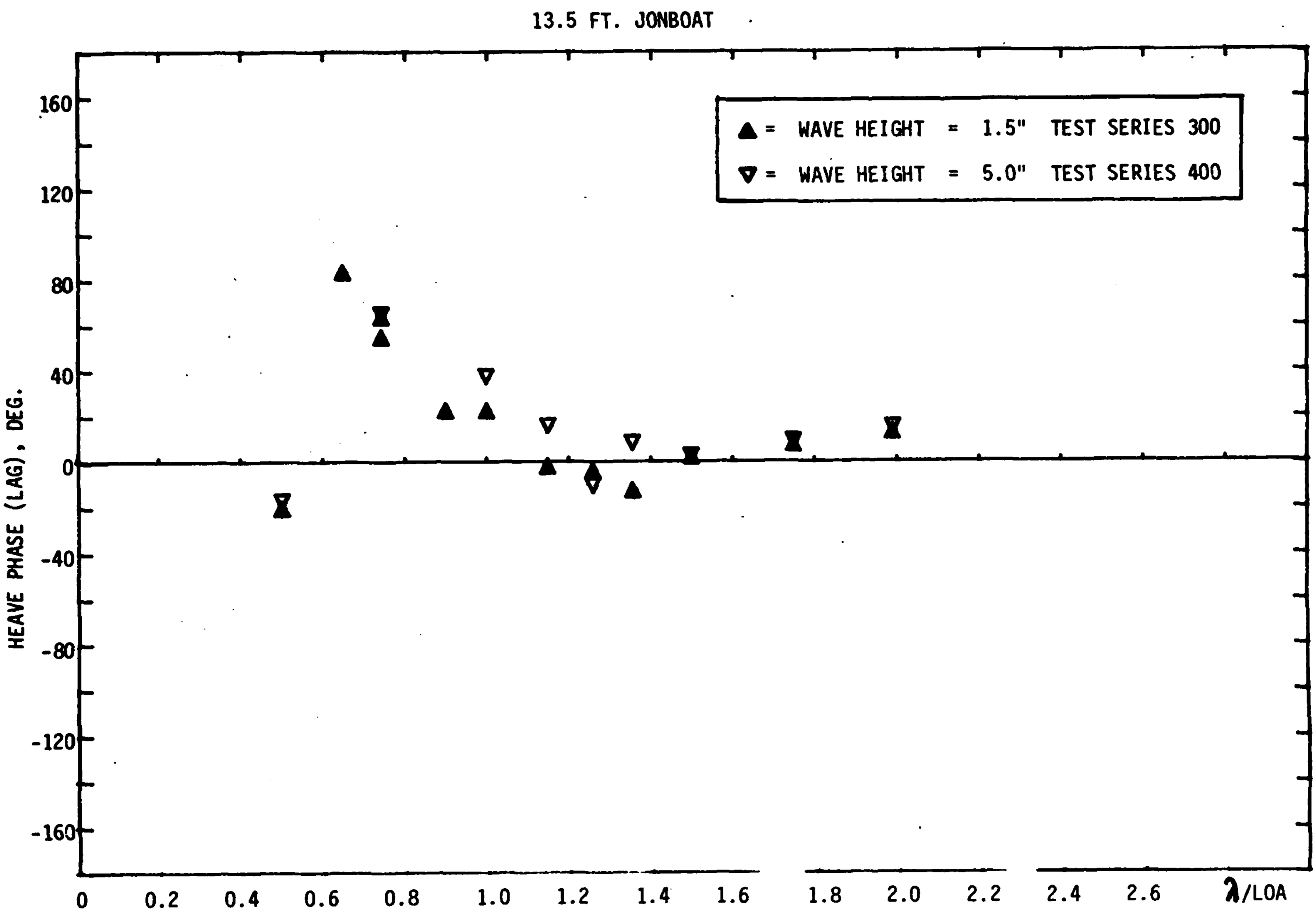

Figure 15 d. HEAVE PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT

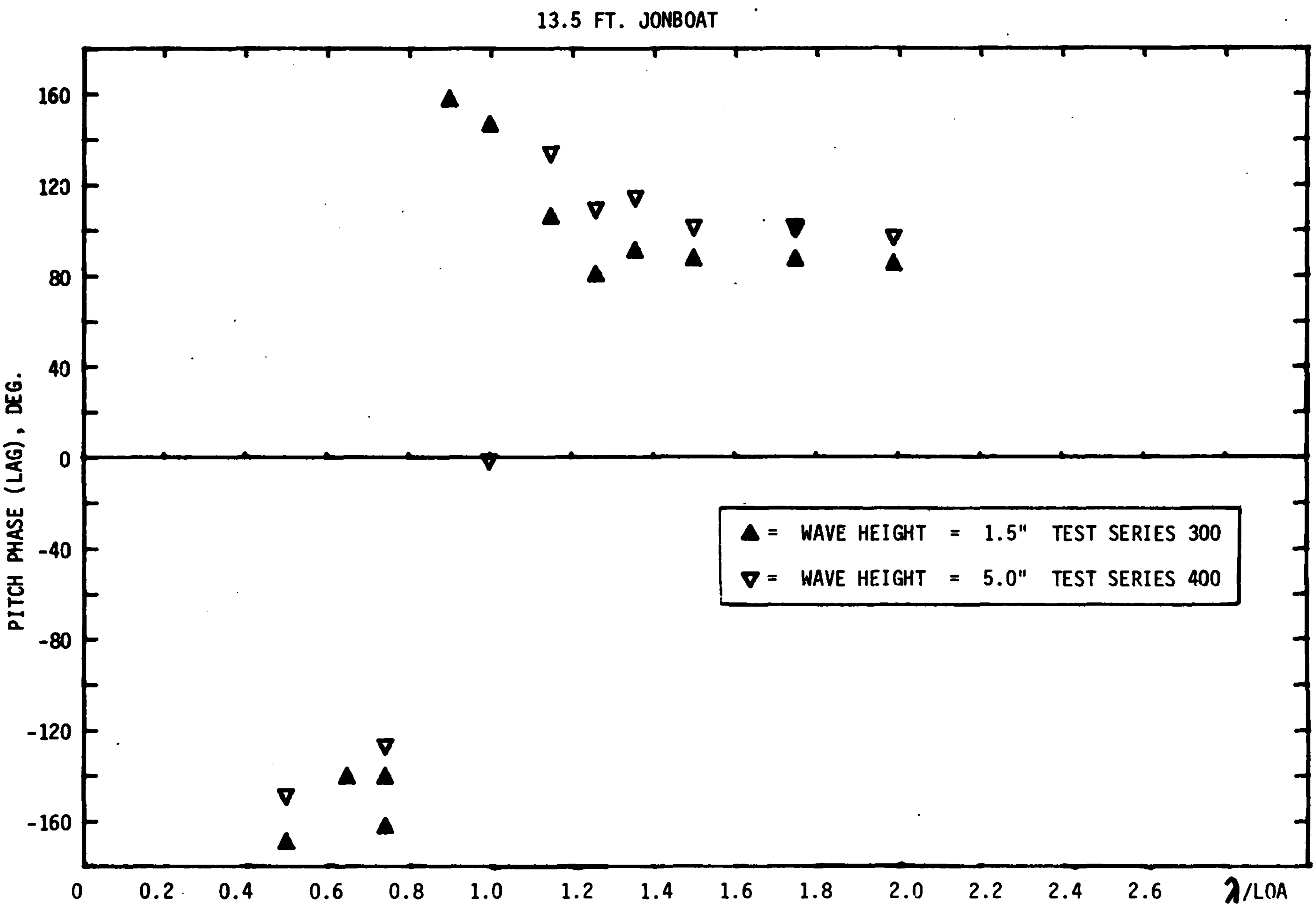

Figure 15 e. PITCH PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT

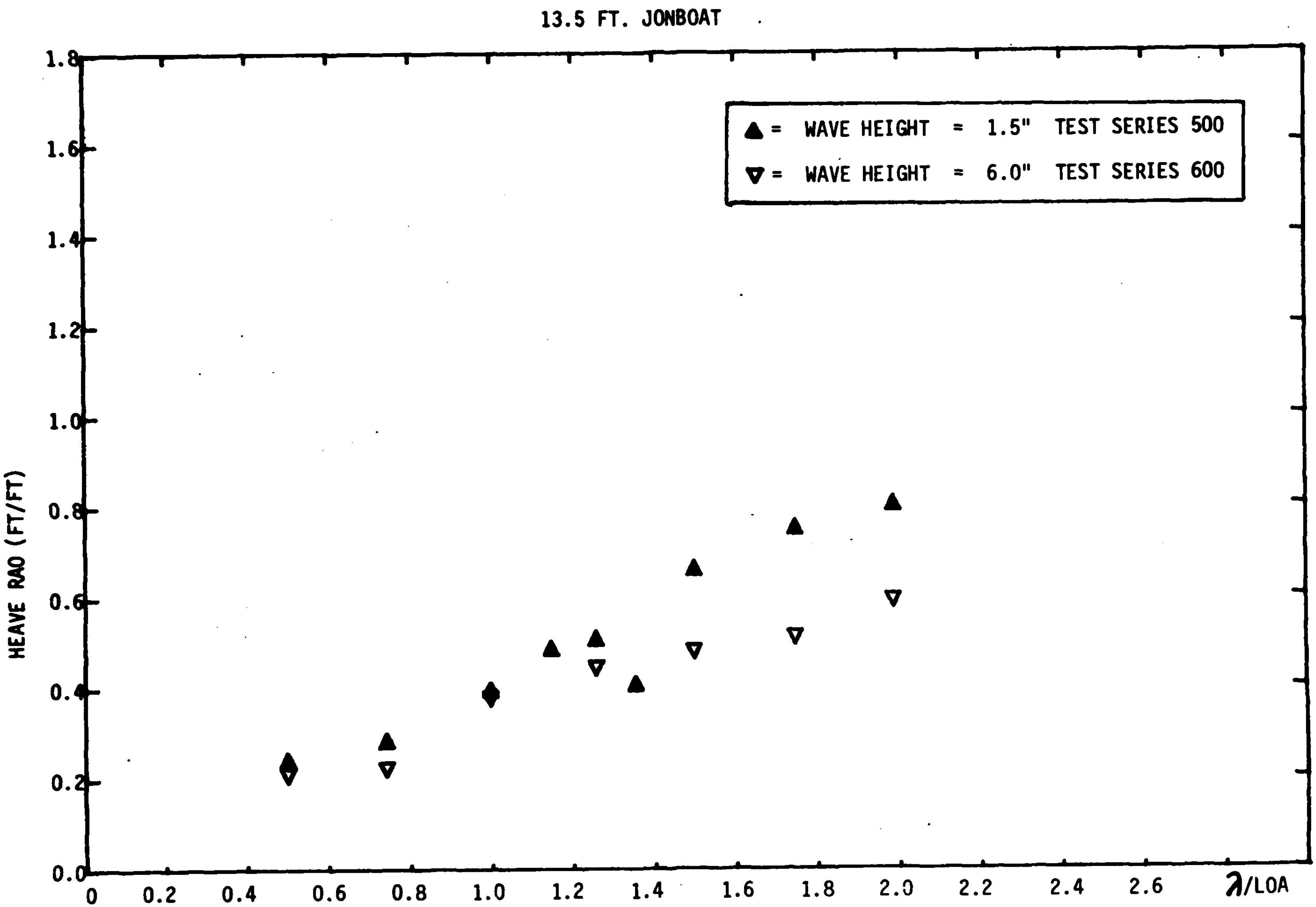

Figure 16 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

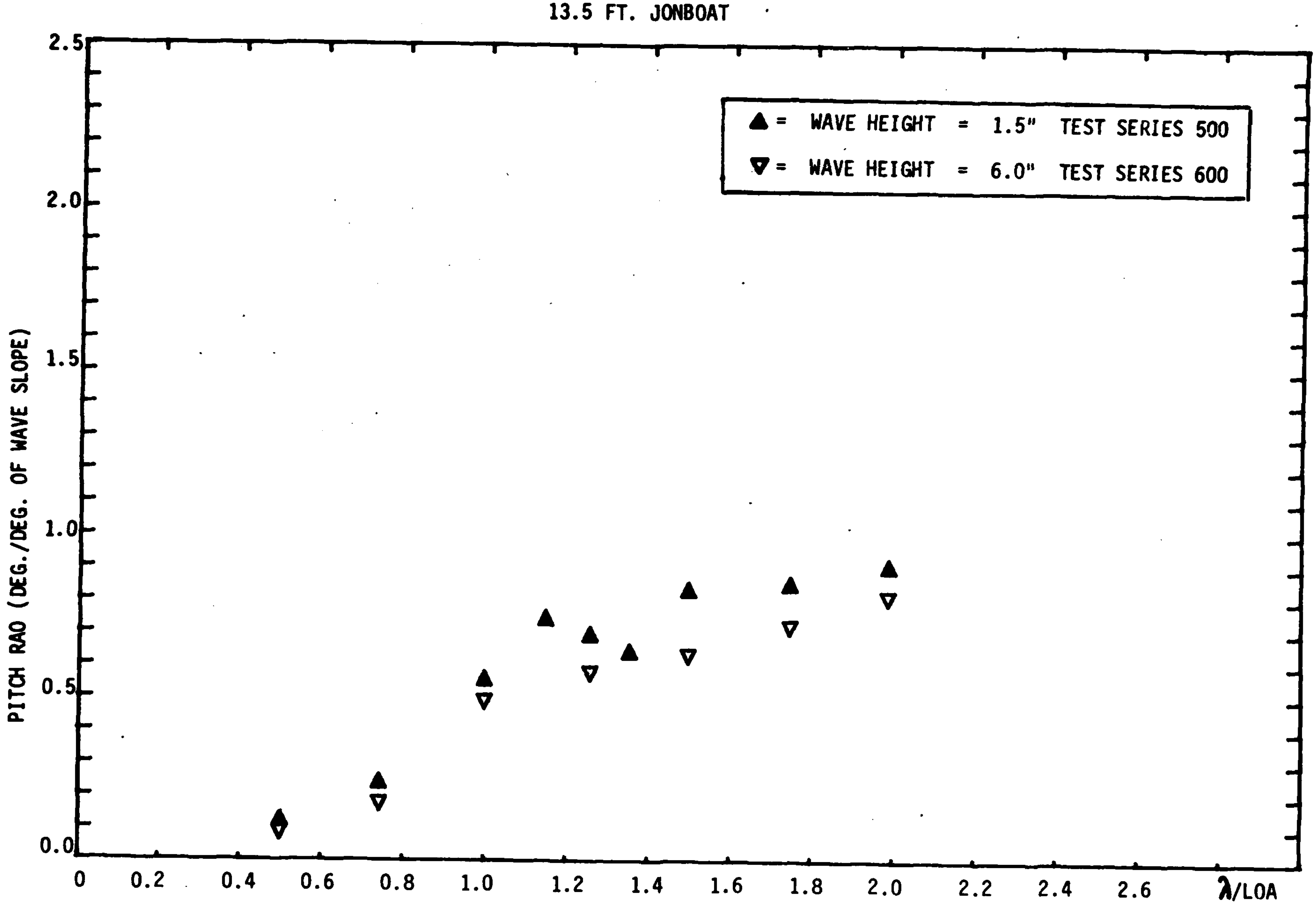

Figure 16 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

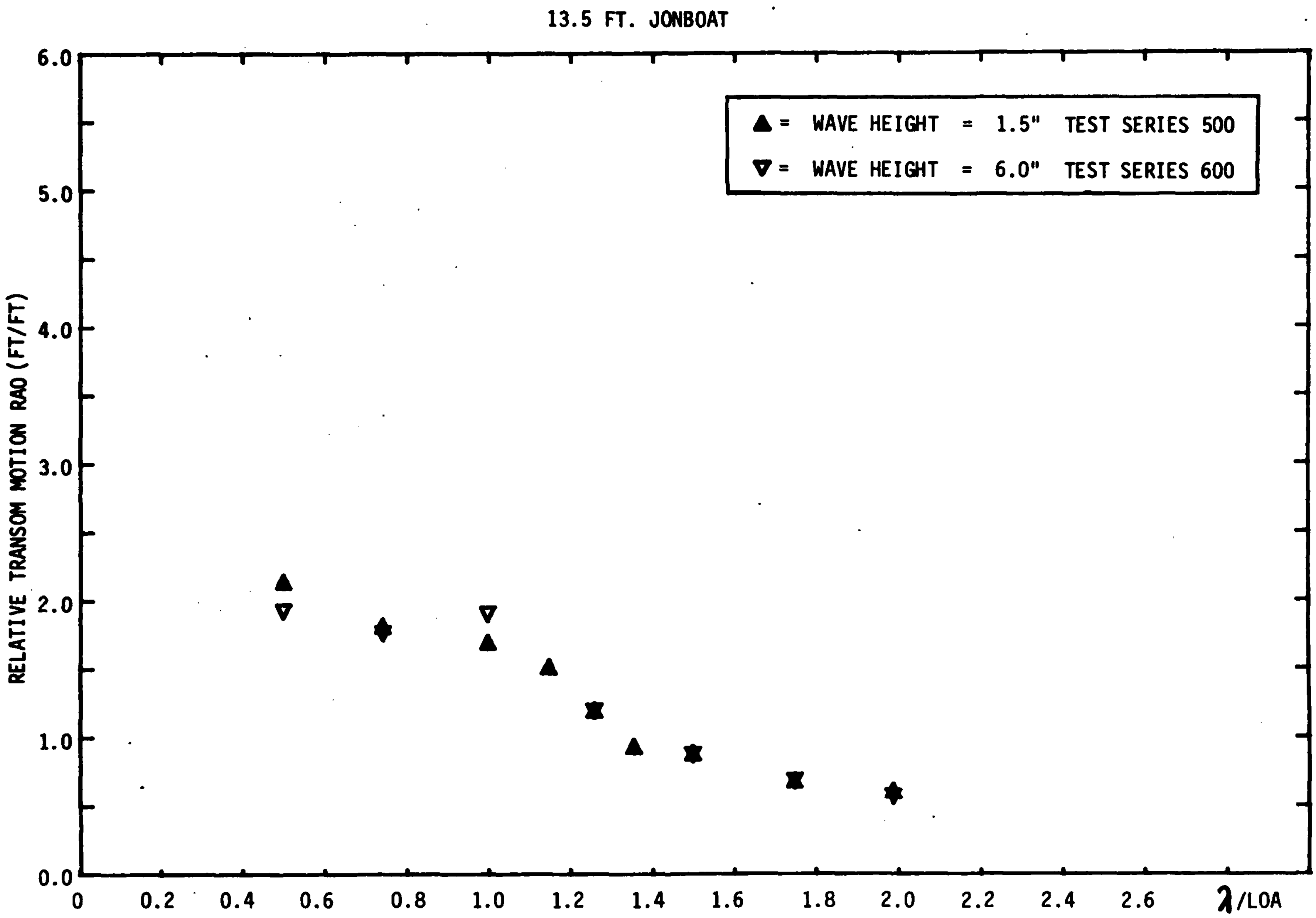

Figure 16 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

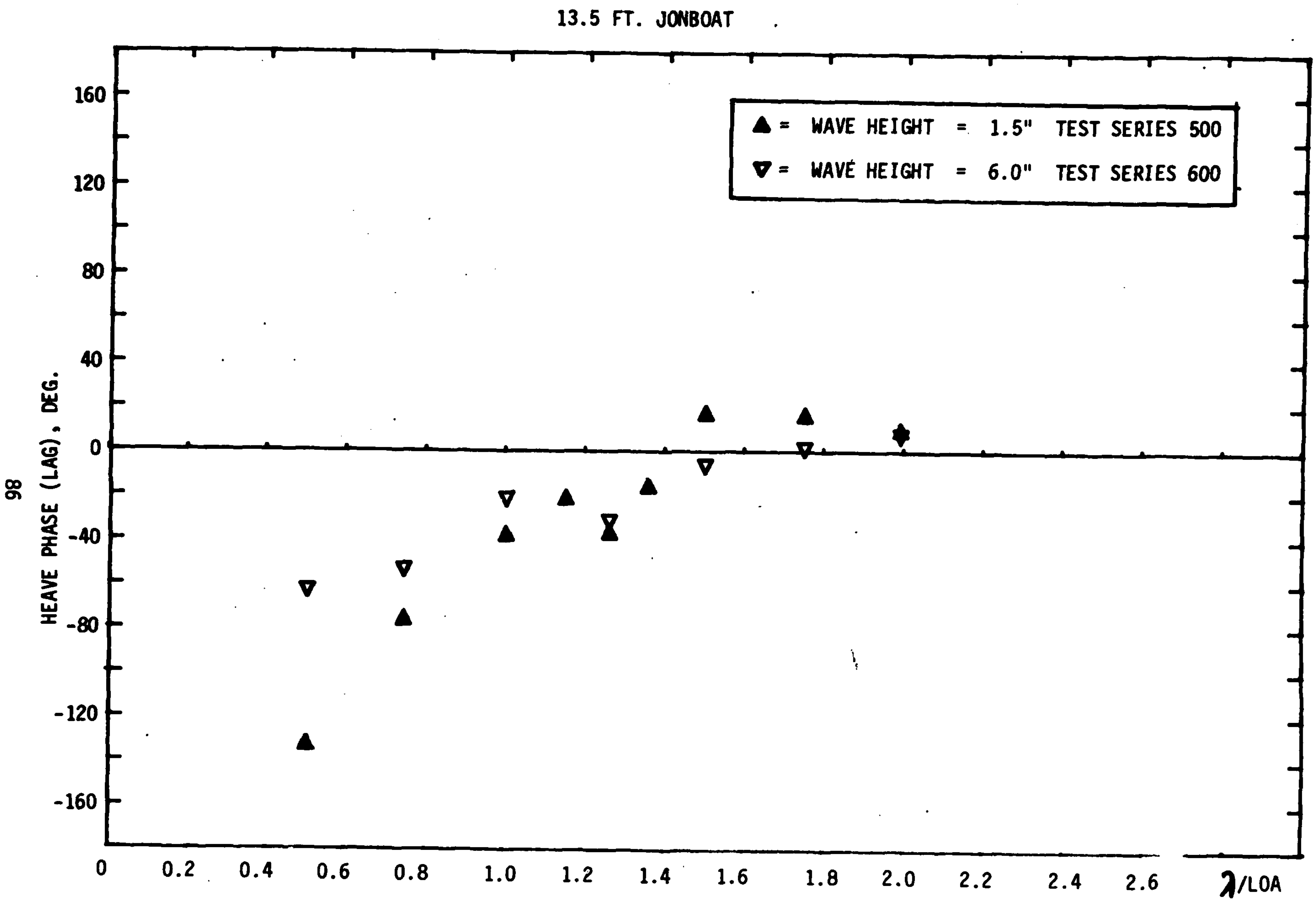

Figure 16 d. HEAVE PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

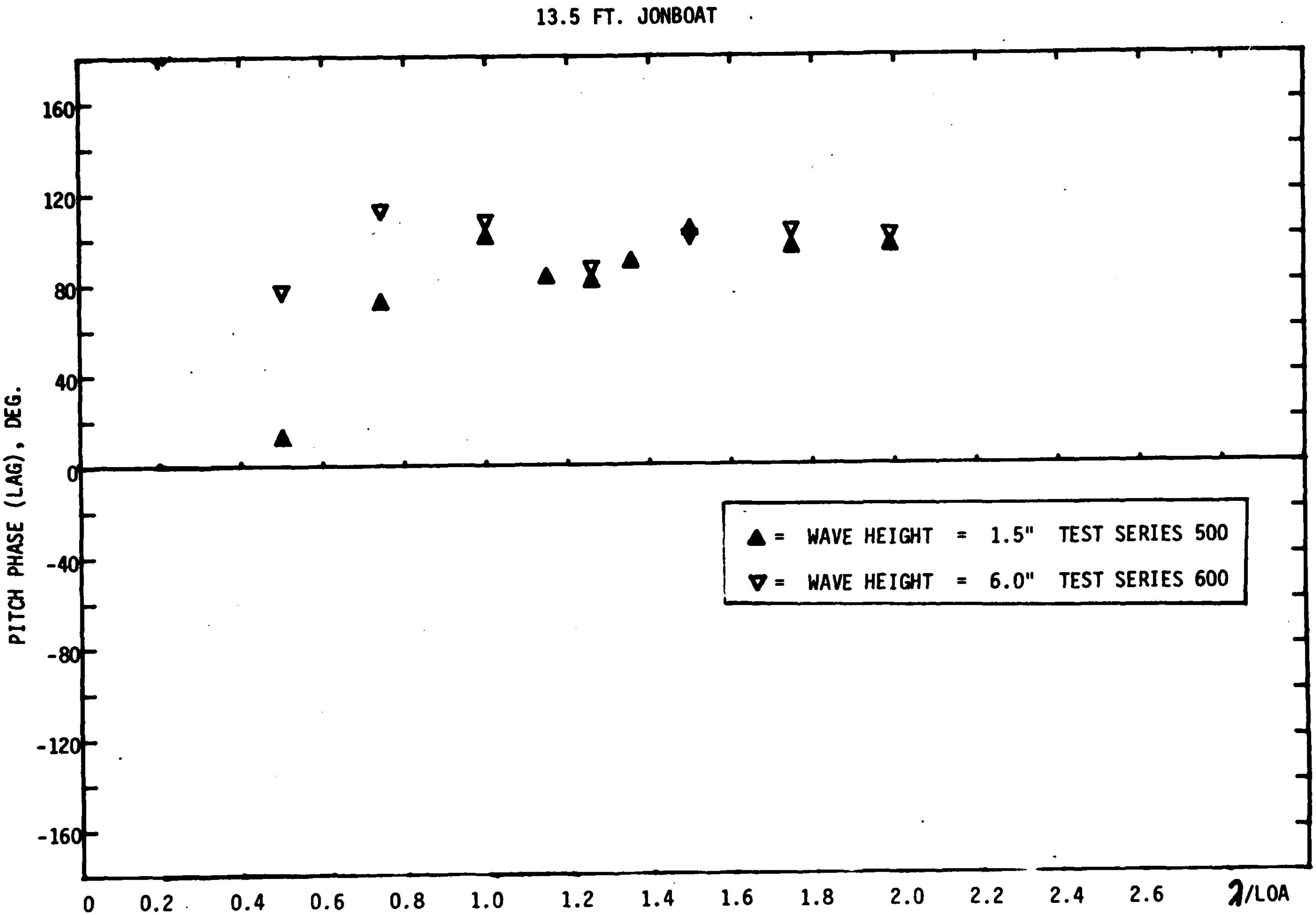

Figure 16 e. PITCH PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

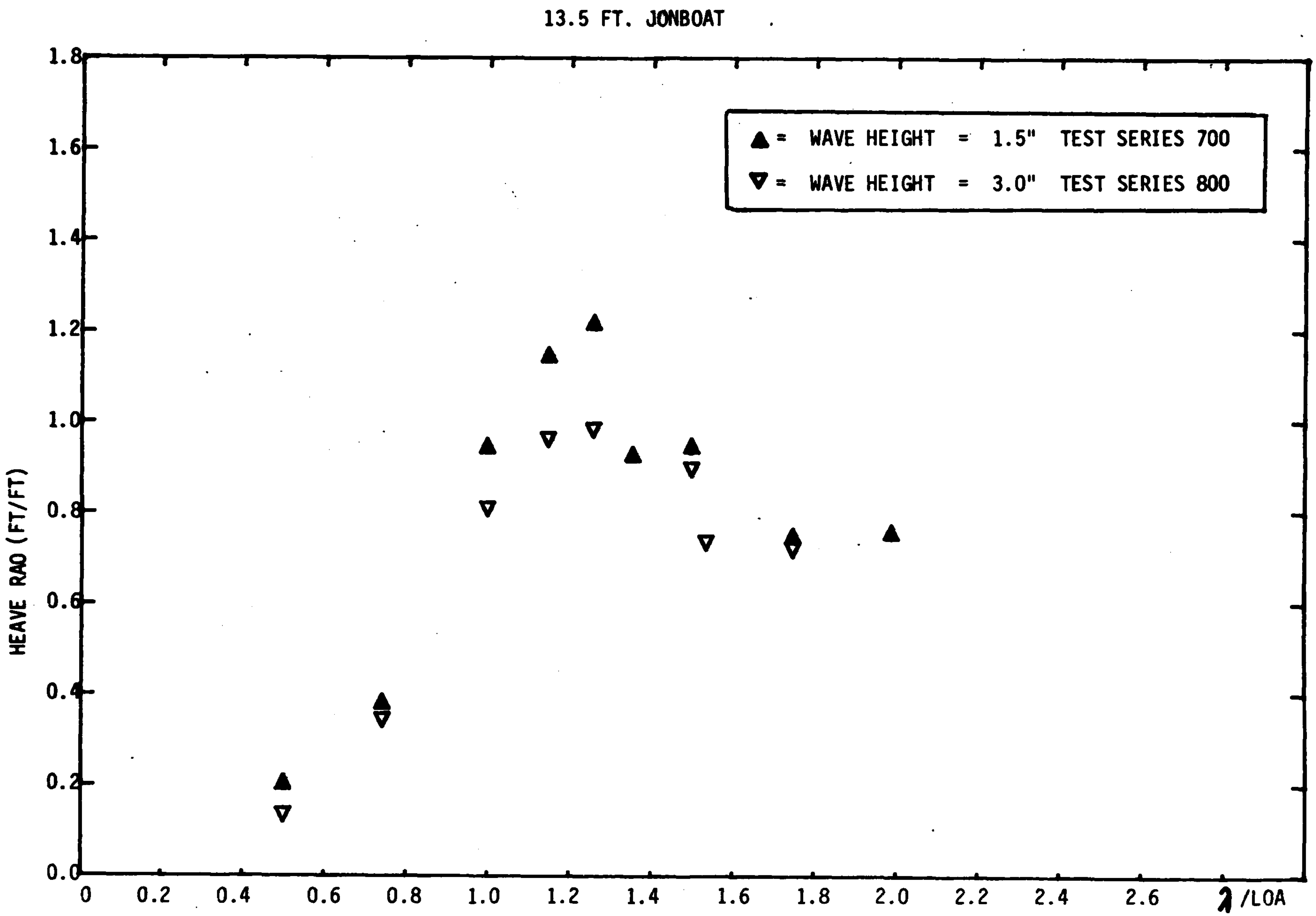

Figure 17 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD

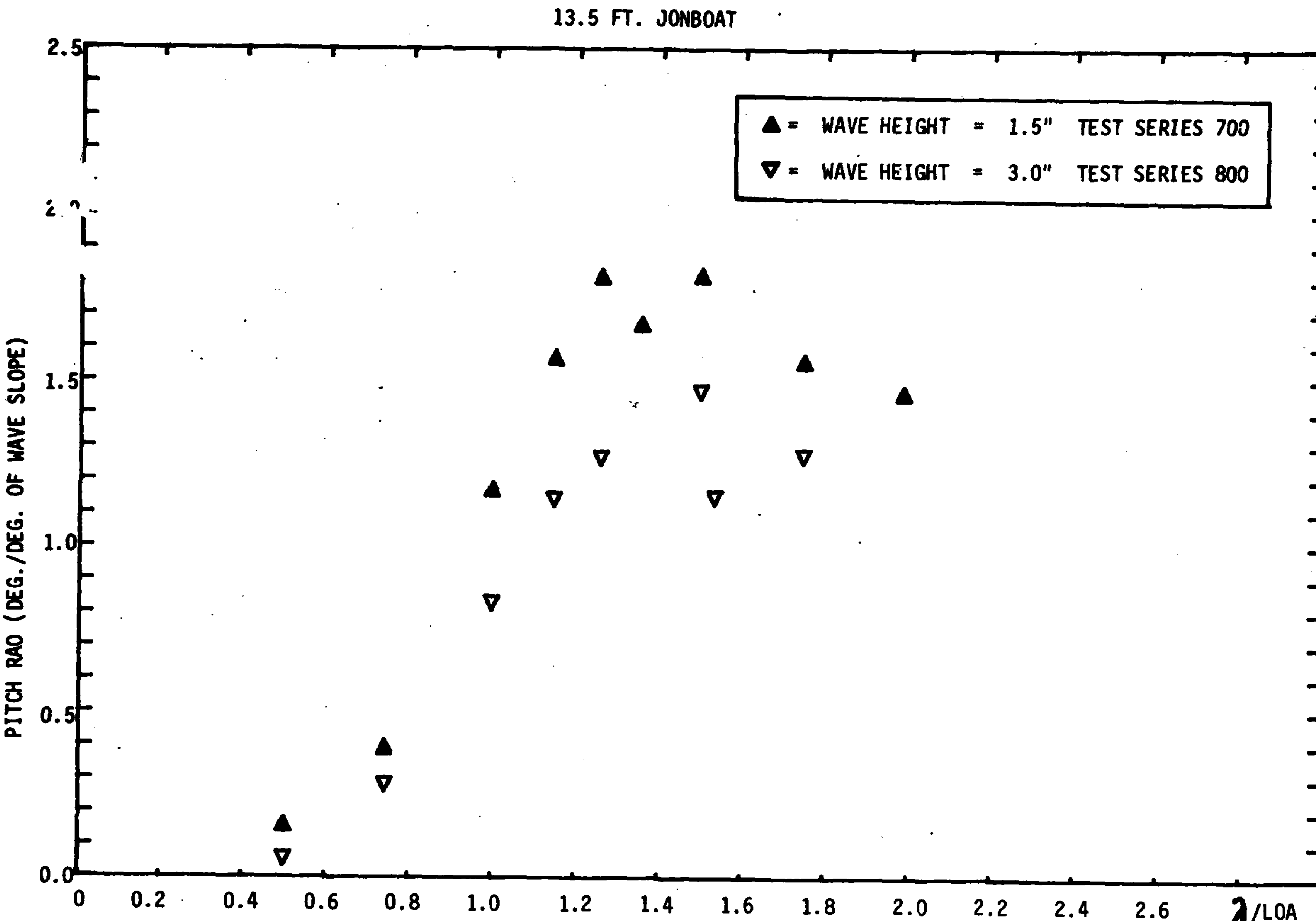

Figure 17 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD

13.5 FT. JONBOAT

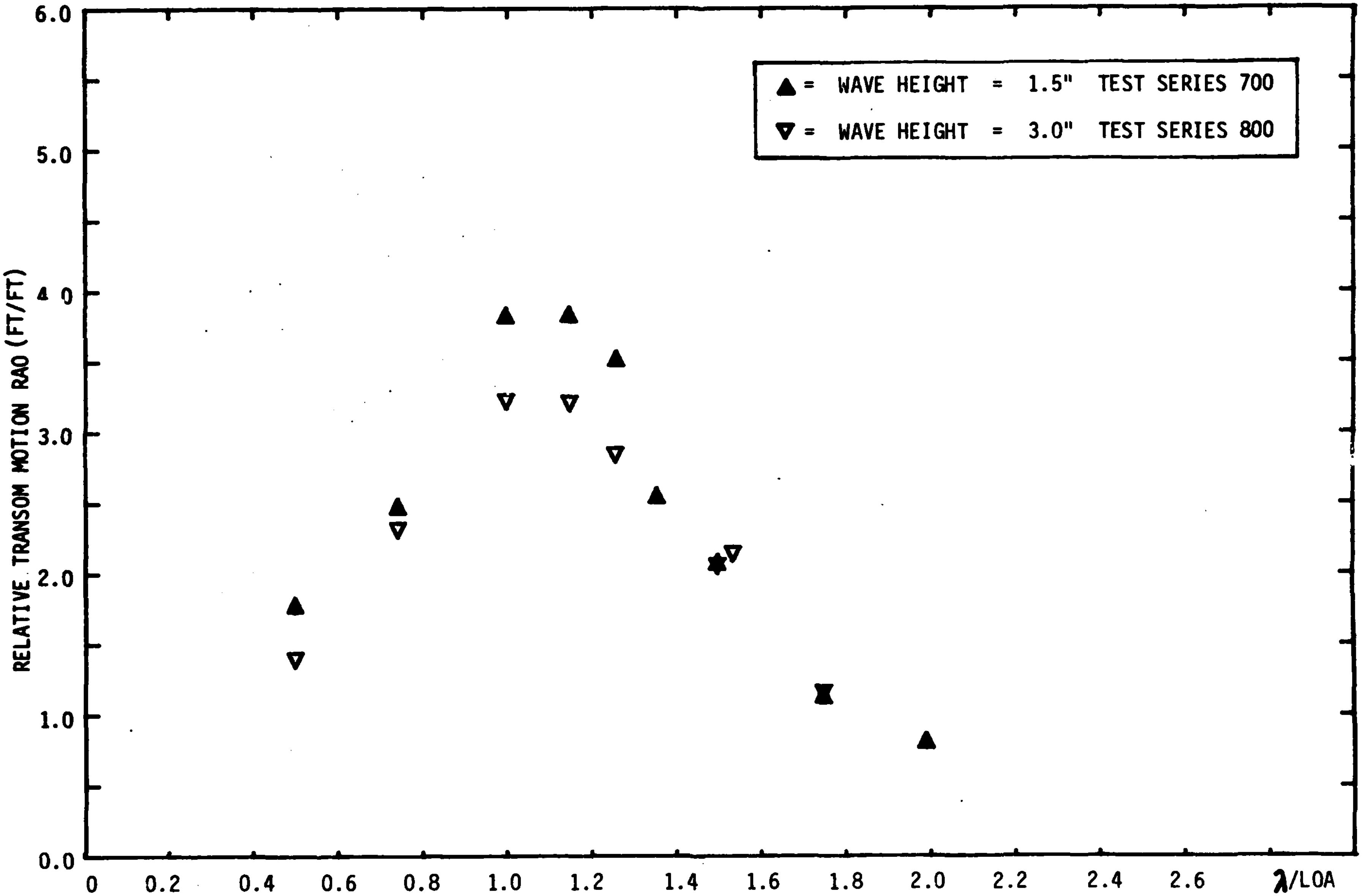

Figure 17 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD

13.5 FT. JONBOAT

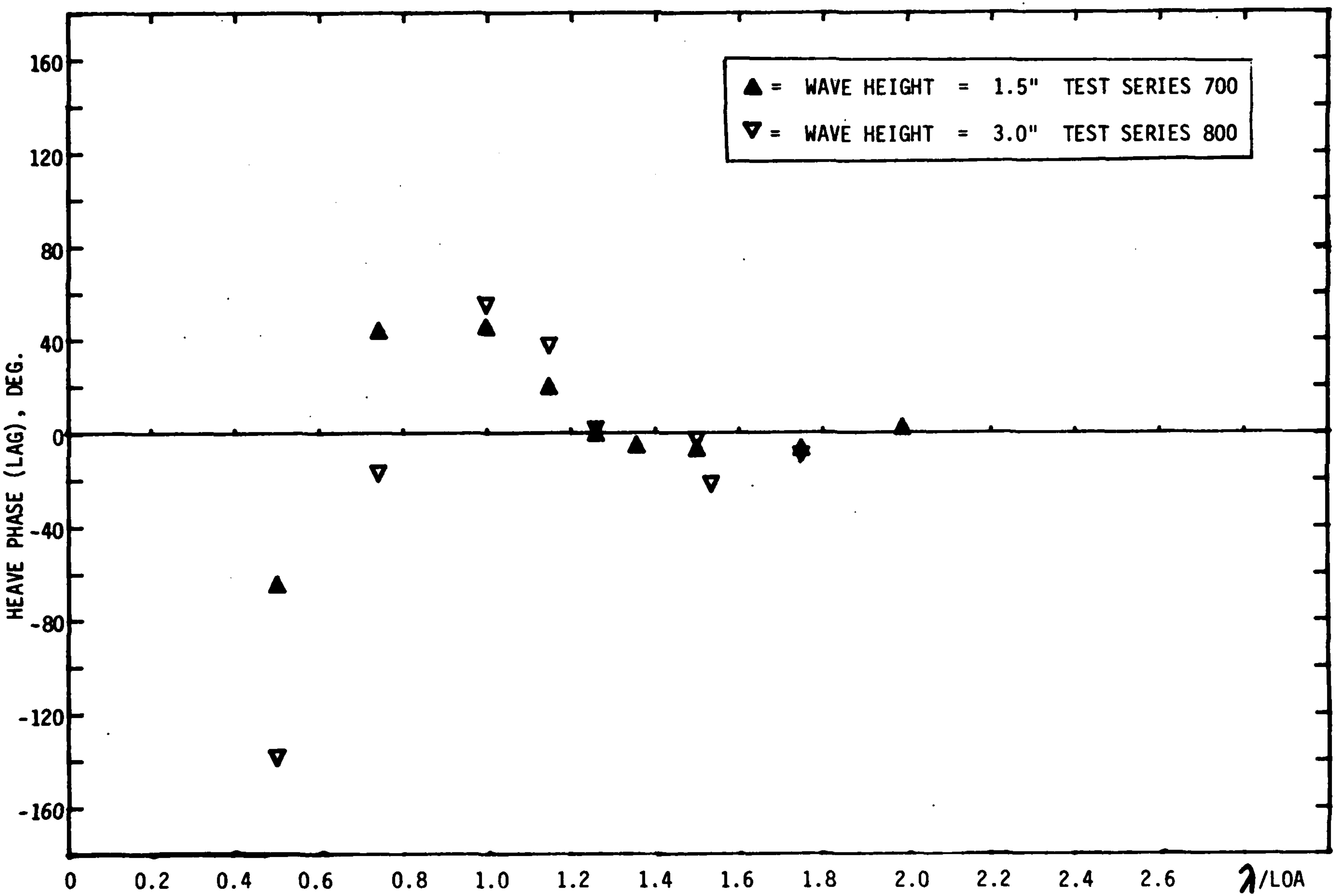

Figure 17 d. HEAVE PHASE AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD

13.5 FT. JONBOAT

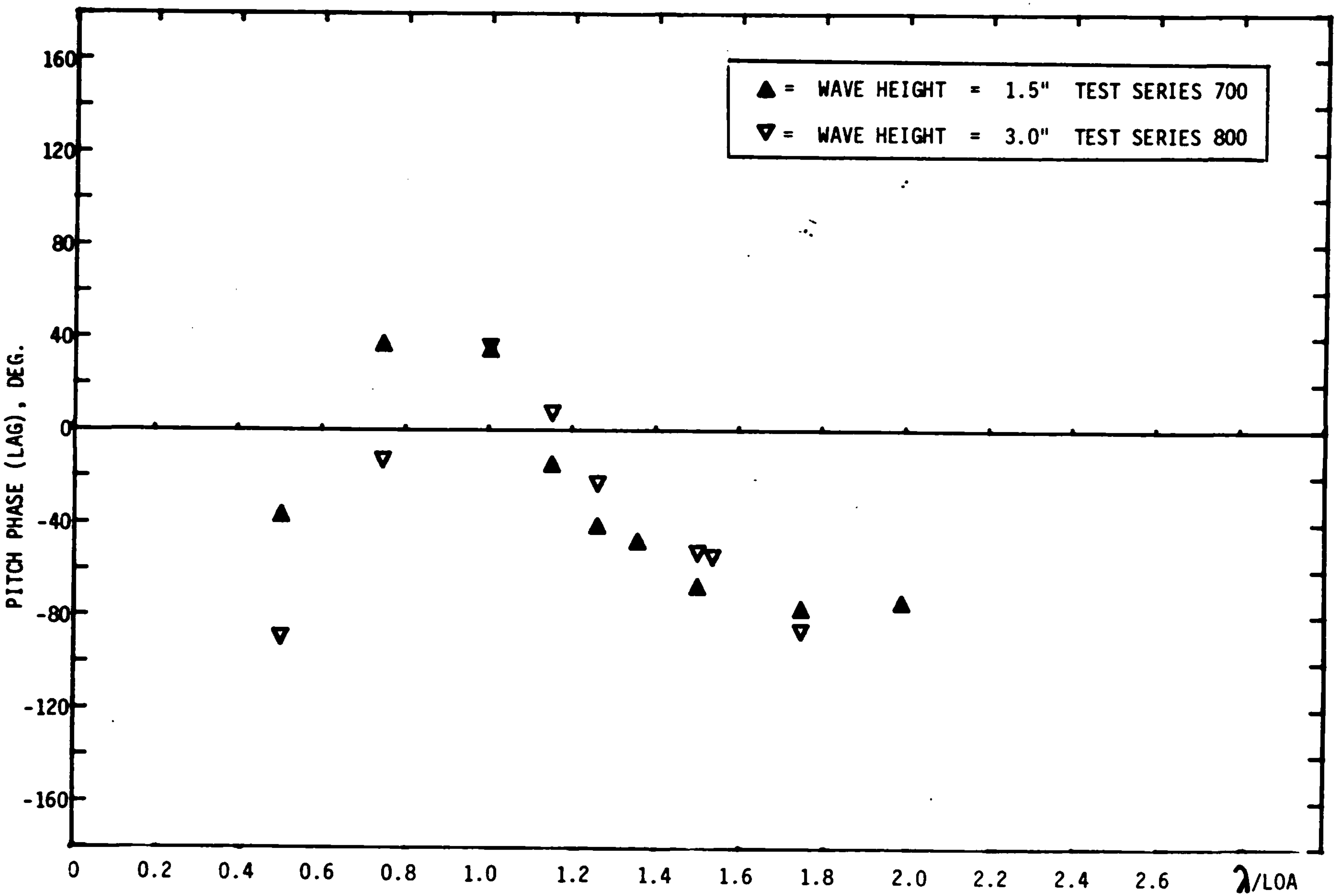

Figure 17 e. PITCH PHASE AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD

HALF-SCALE MODEL OF 13.5 FT. JONBOAT

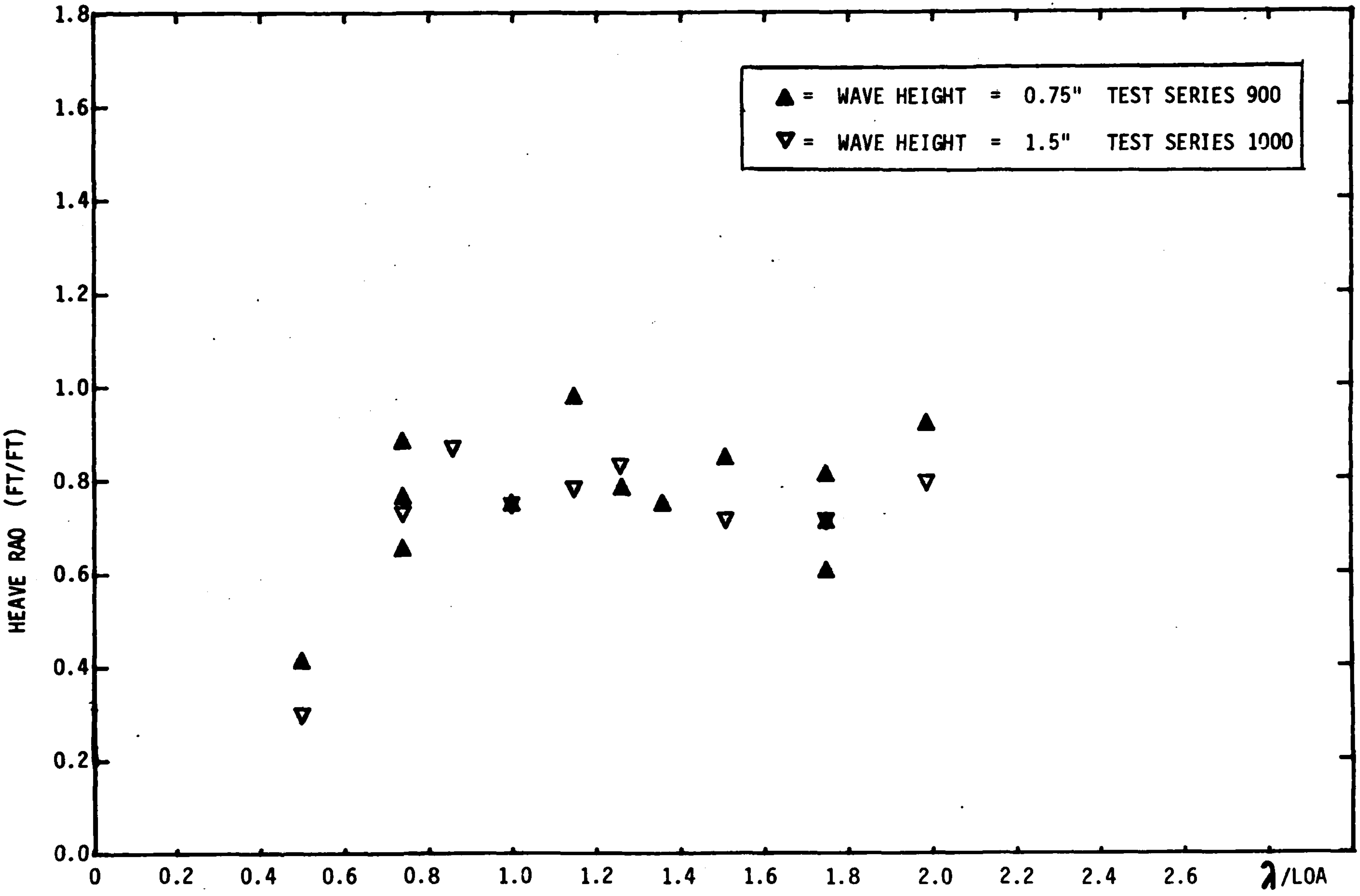

Figure 18 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

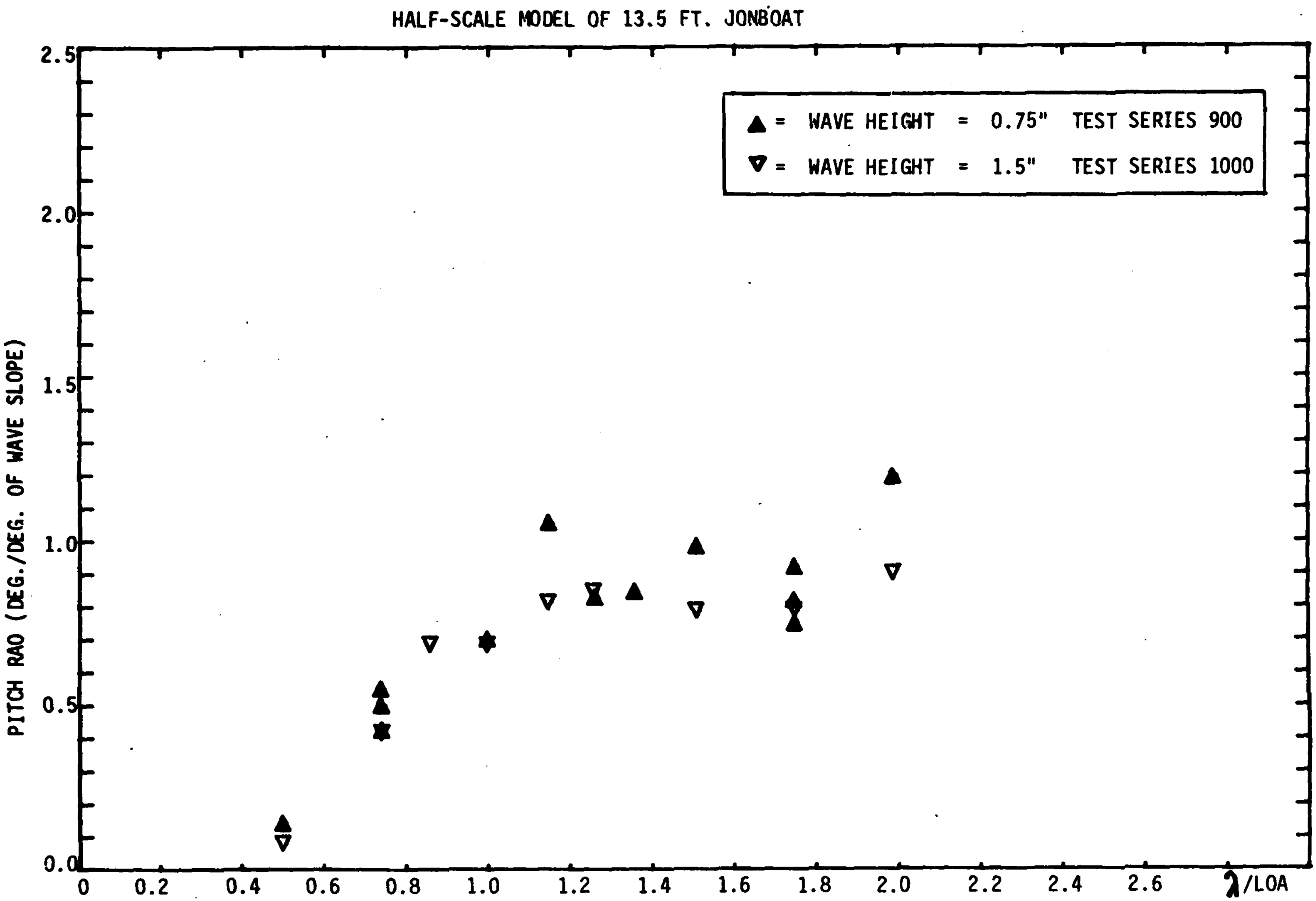

Figure 18 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

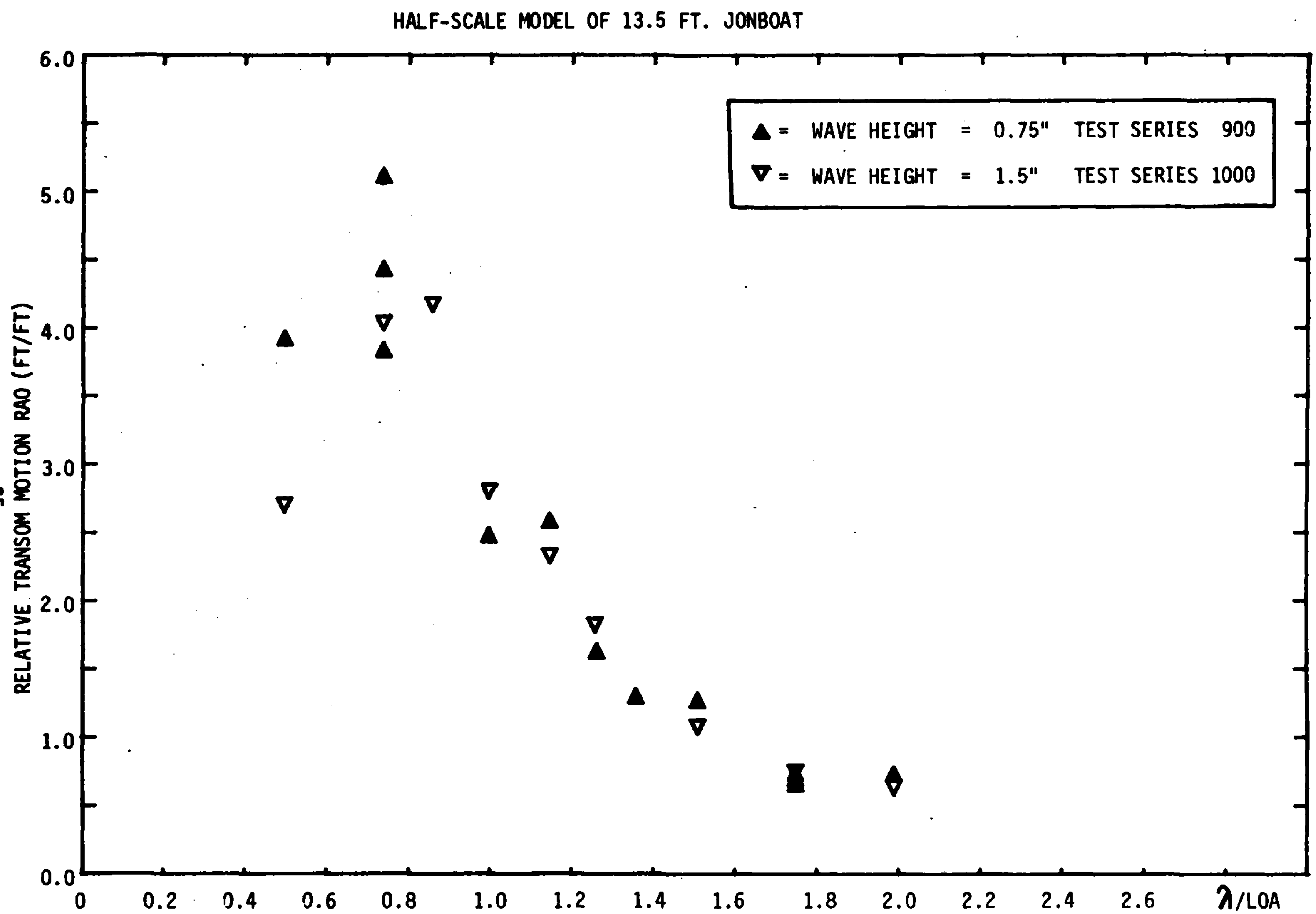

Figure 18 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

HALF-SCALE MODEL OF 13.5 FT. JONBOAT

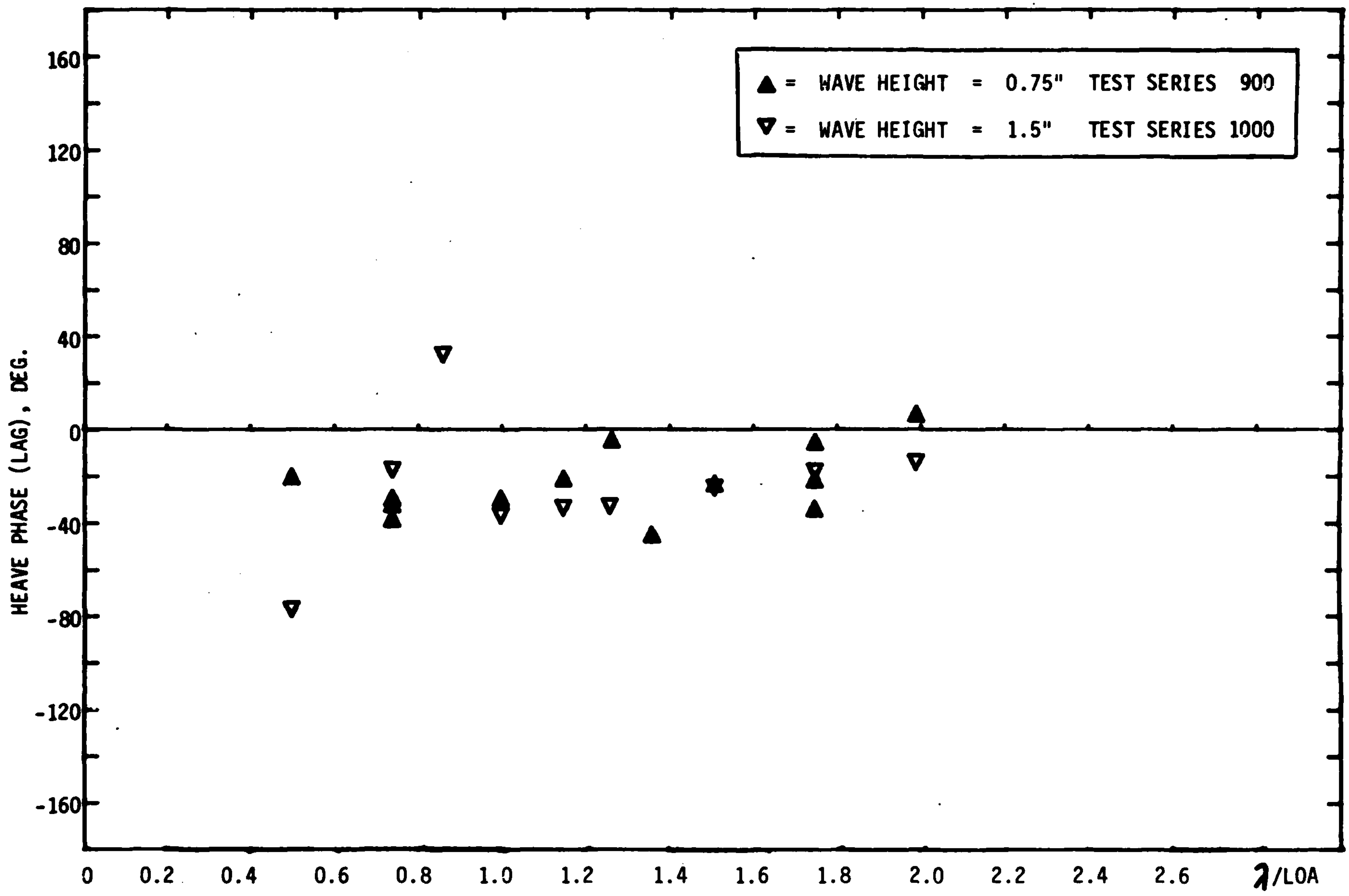

Figure 18 d. HEAVE PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

HALF-SCALE MODEL OF 13.5 FT. JONBOAT

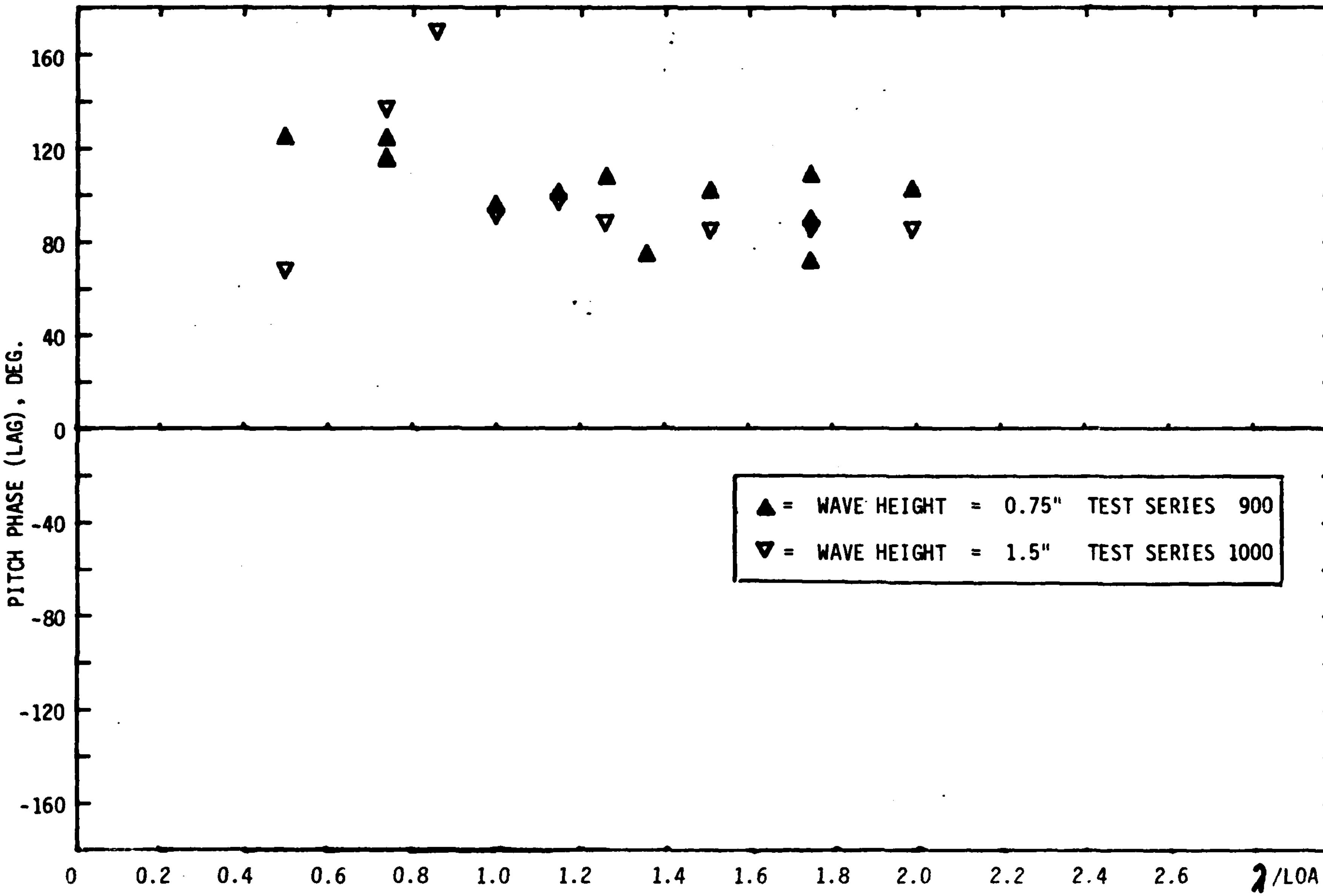

Figure 18 e. PITCH PHASE AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

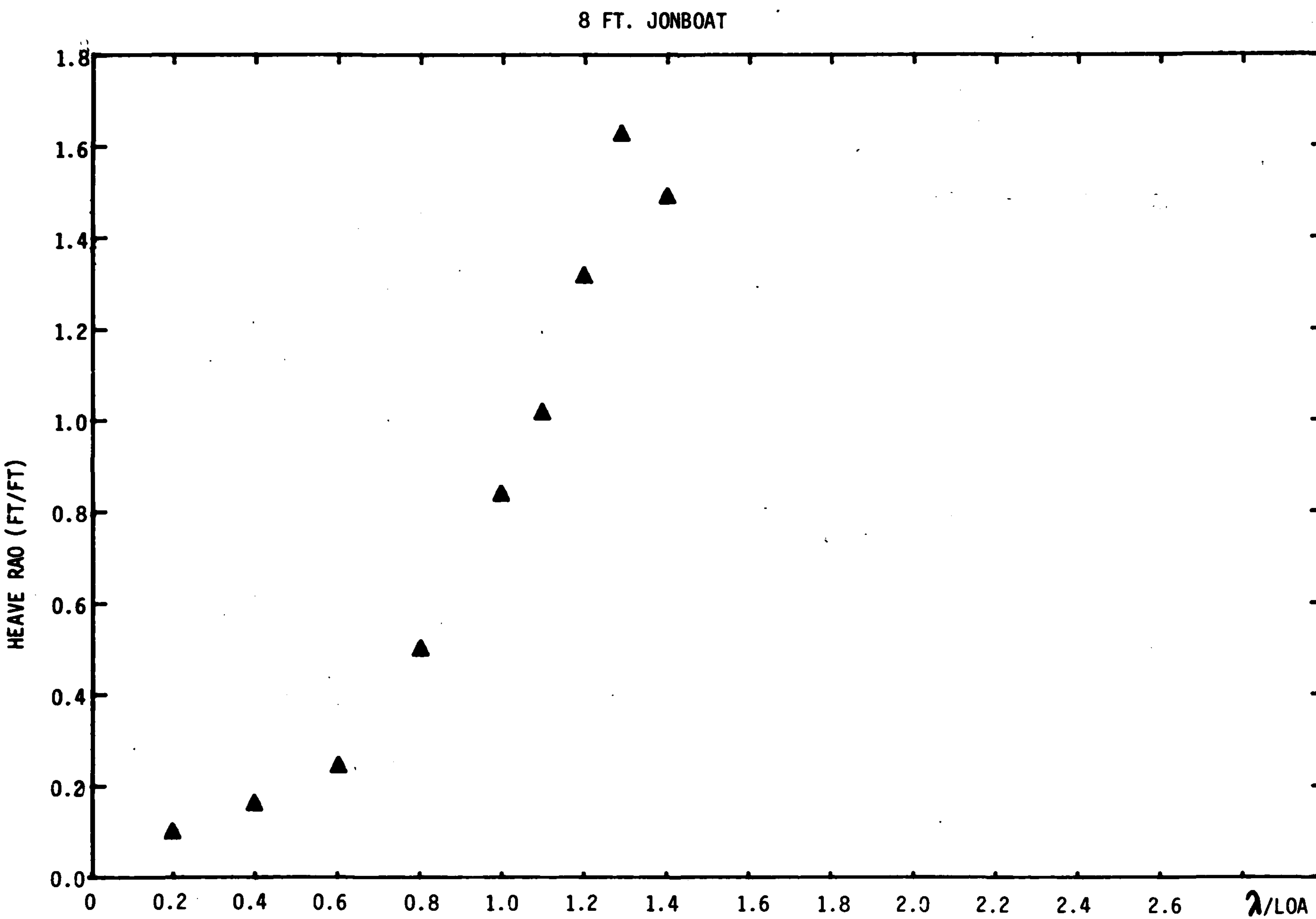

Figure 19 a. HEAVE RAO, WAVE HEIGHT=1.5", 1 MAN AFT, STERN WAVES, TEST SERIES 1100

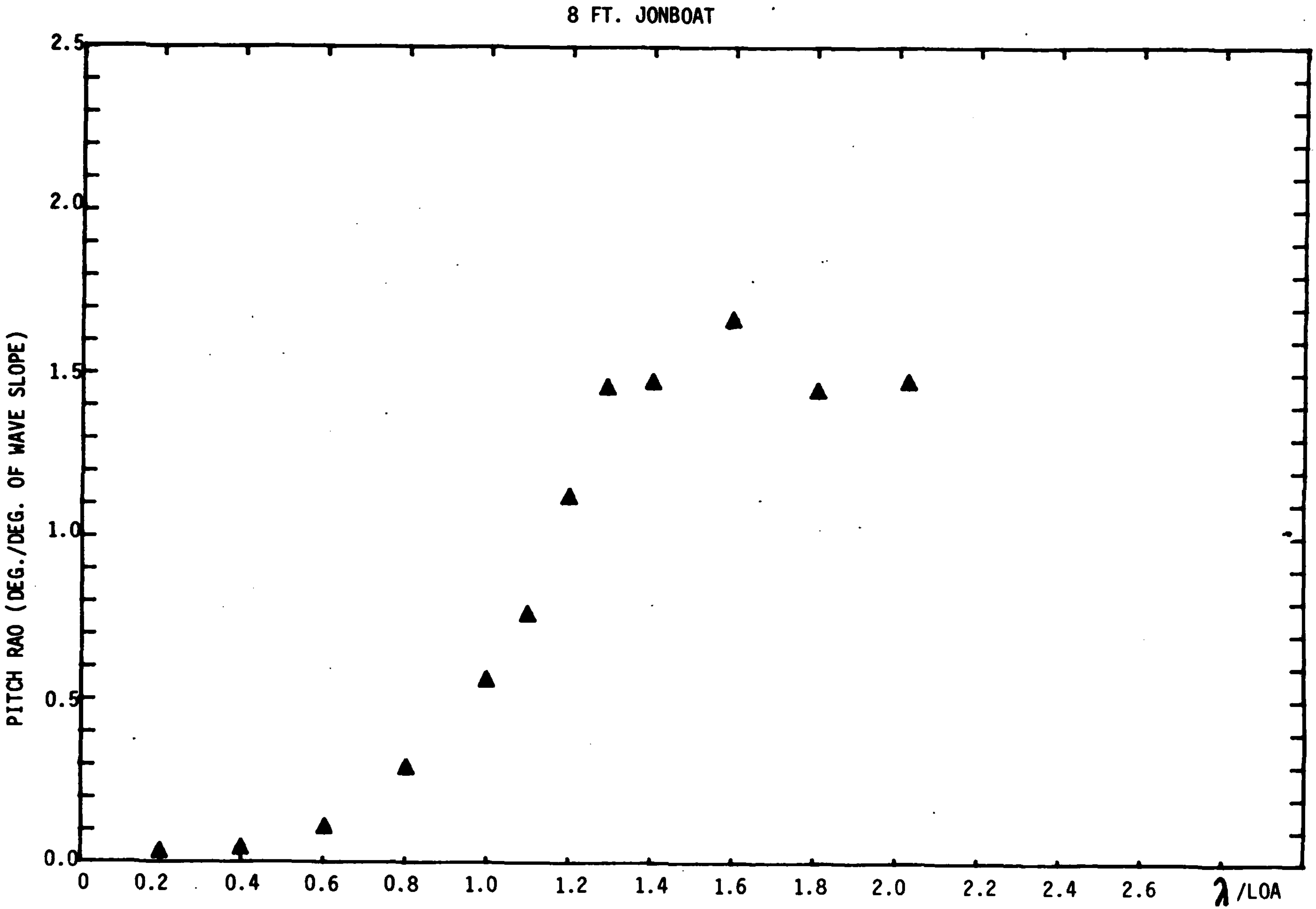

Figure 19 b. PITCH RAO , WAVE HEIGHT=1.5", 1 MAN AFT, STERN WAVES, TEST SERIES 1100

8 FT. JONBOAT

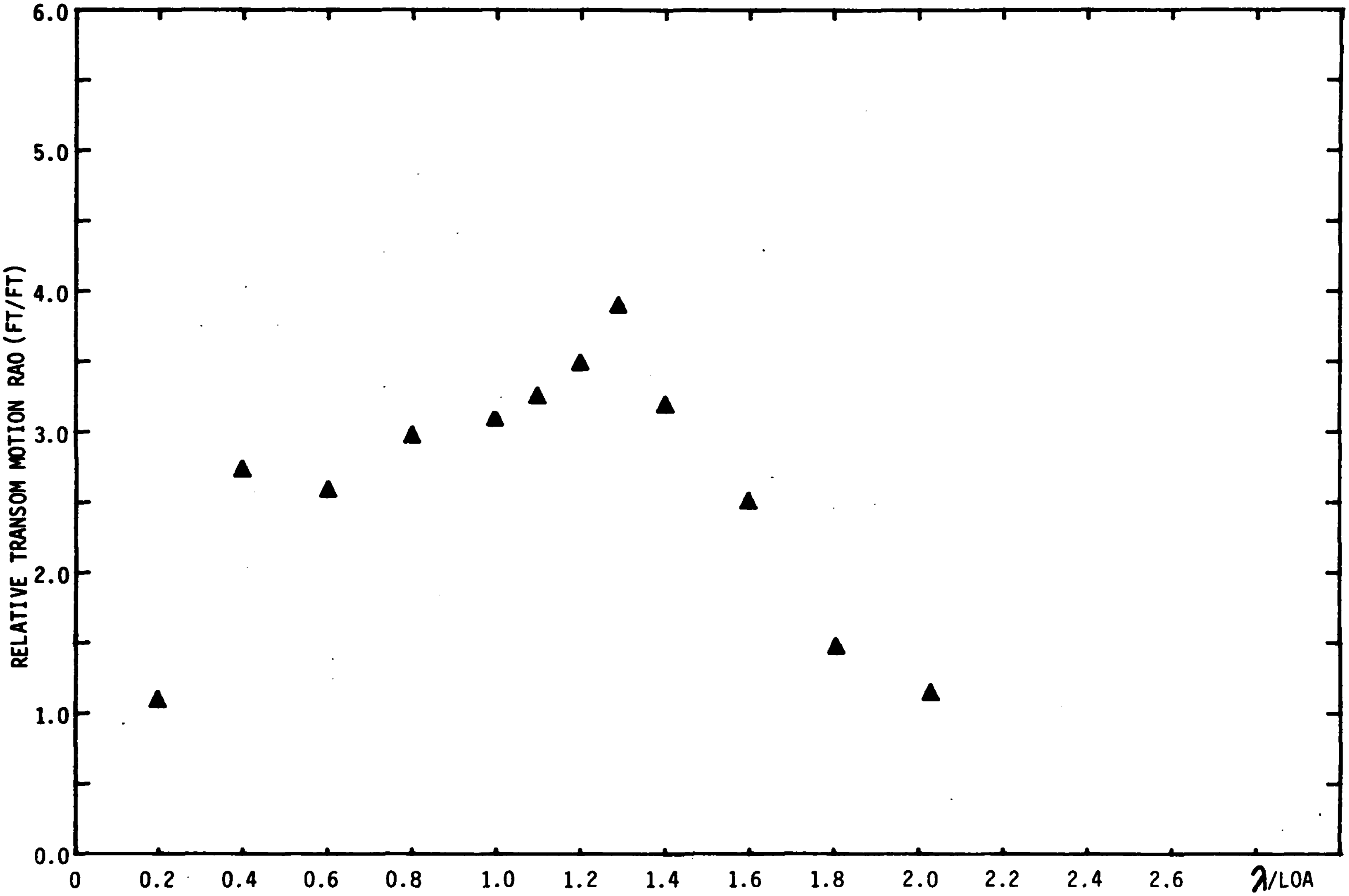

Figure 19 c. RELATIVE TRANSOM MOTION RAO, WAVE HEIGHT=1.5", 1 MAN AFT, STERN WAVES, TEST SERIES 1100

8 FT. JONBOAT

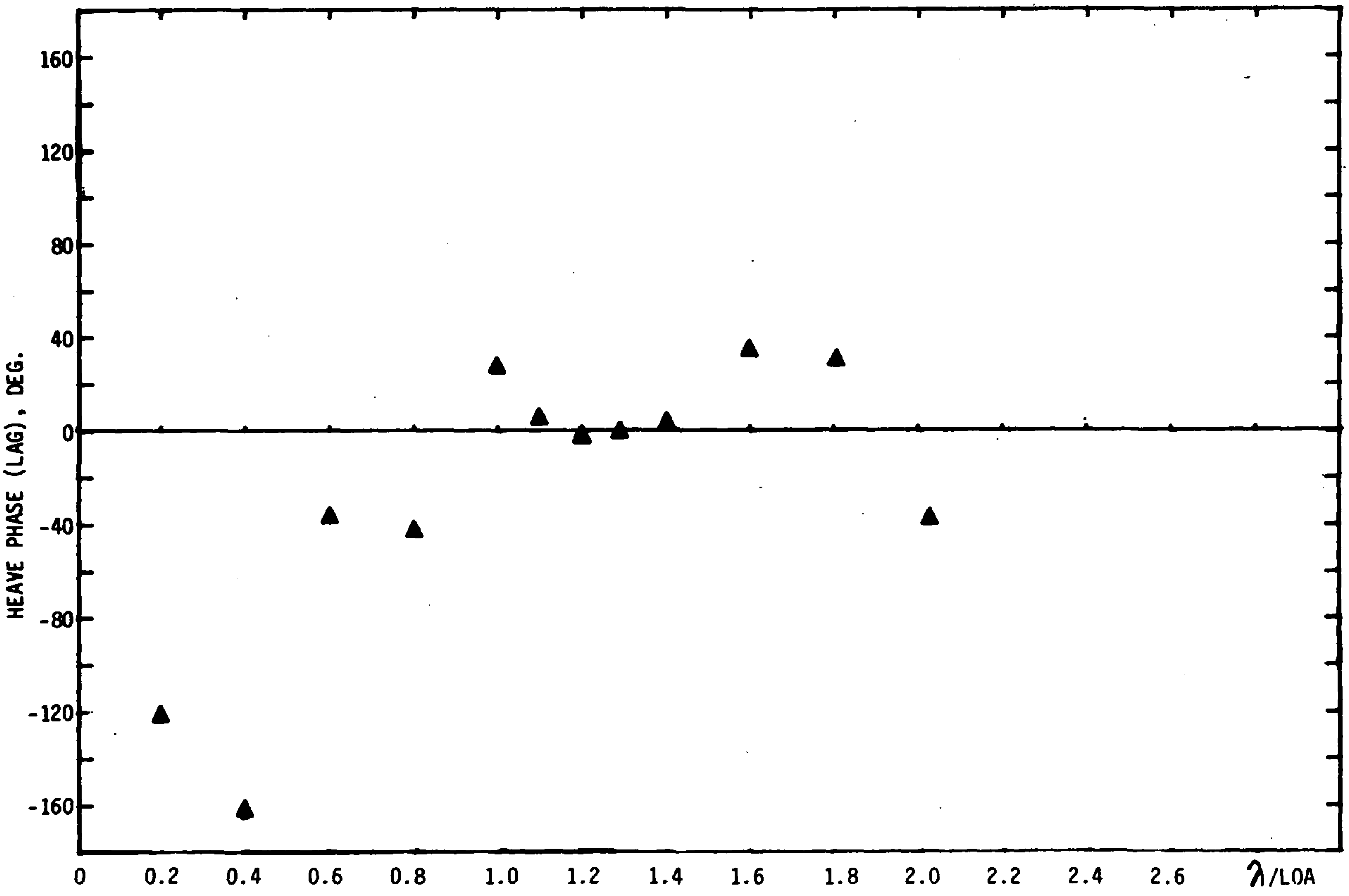

Figure 19 d. HEAVE PHASE , WAVE HEIGHT=1.5", 1 MAN AFT, STERN WAVES, TEST SERIES 1100

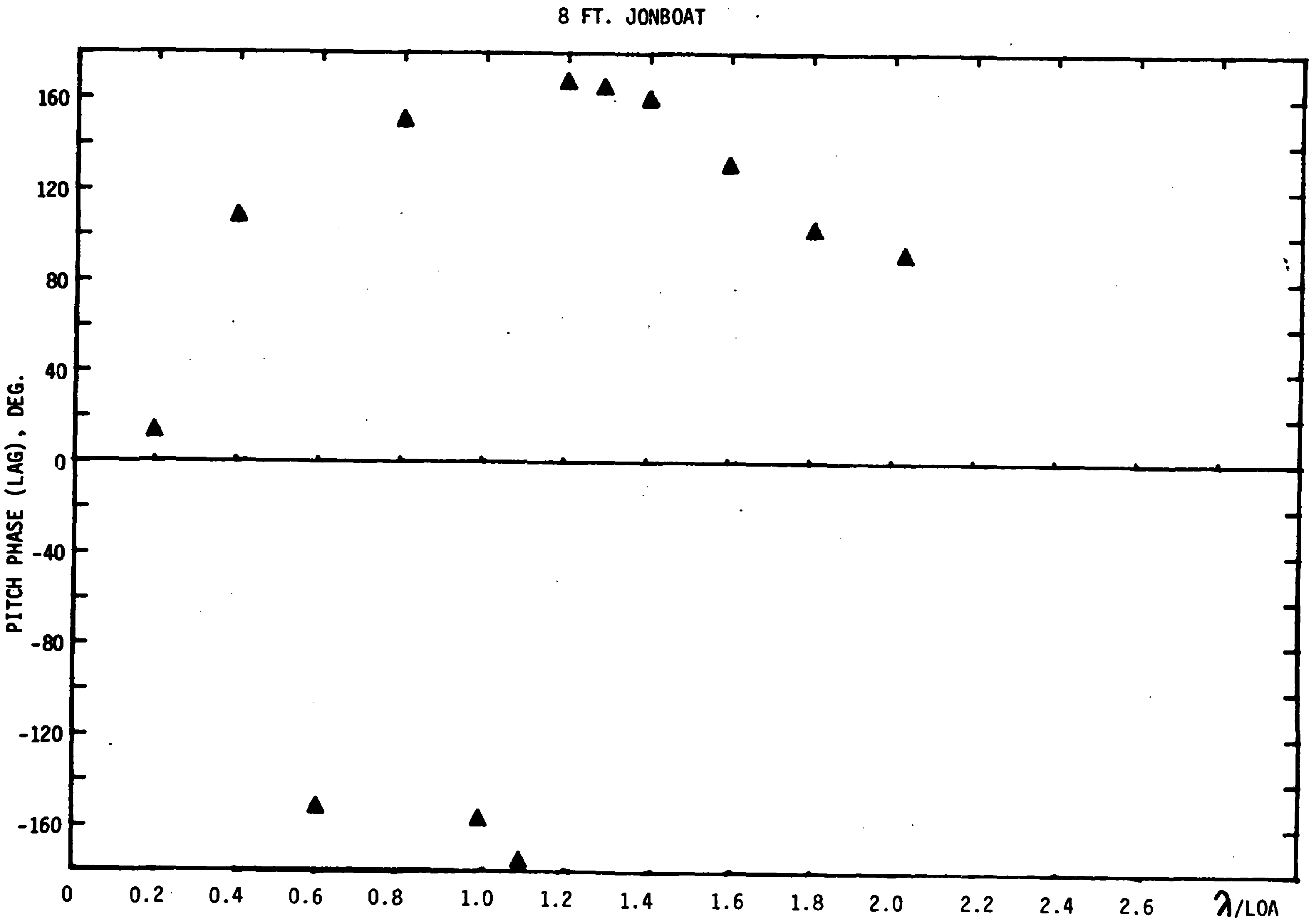

Figure 19 e. PITCH PHASE, WAVE HEIGHT=1.5", 1 MAN AFT, STERN WAVES, TEST SERIES 1100

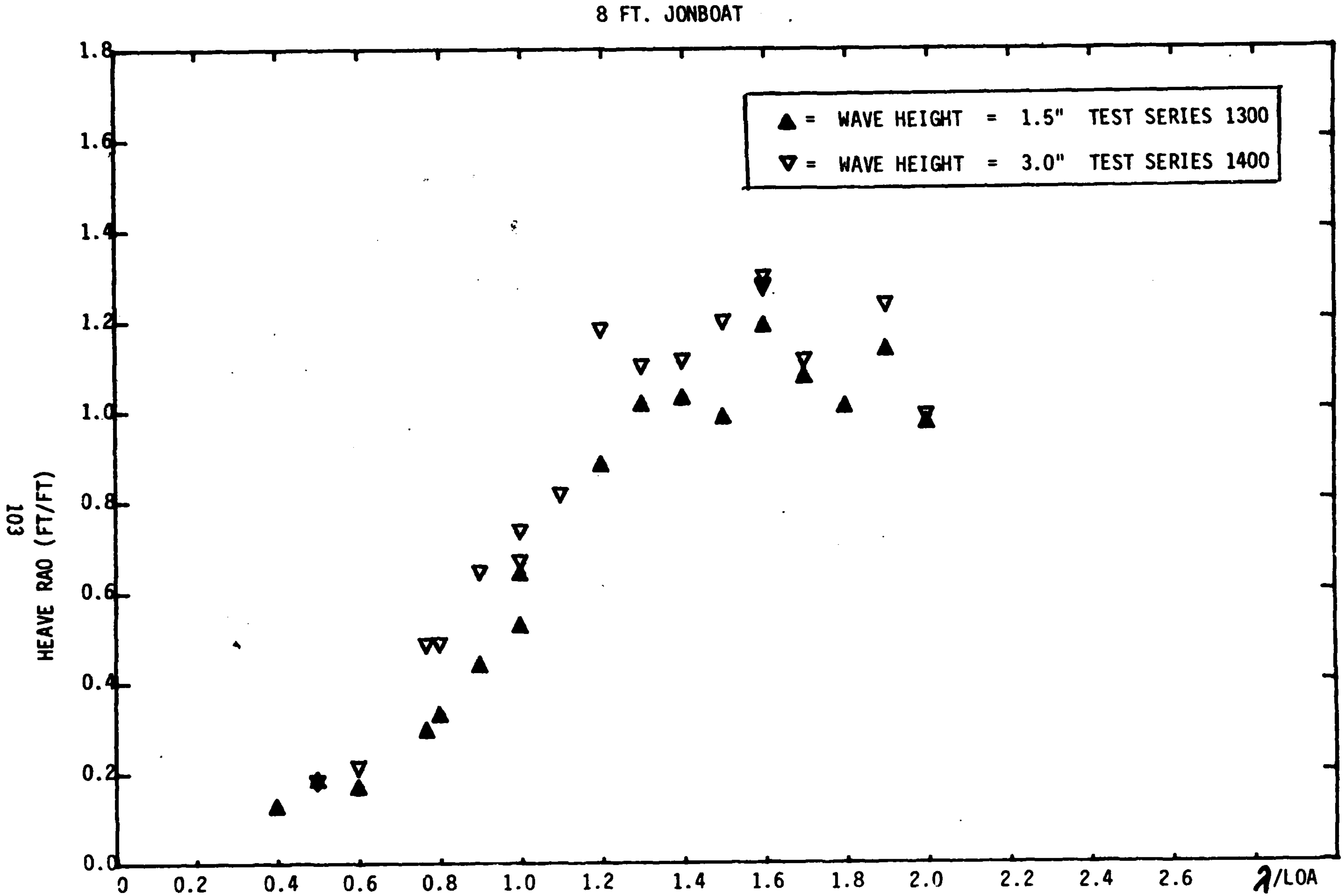

Figure 20 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

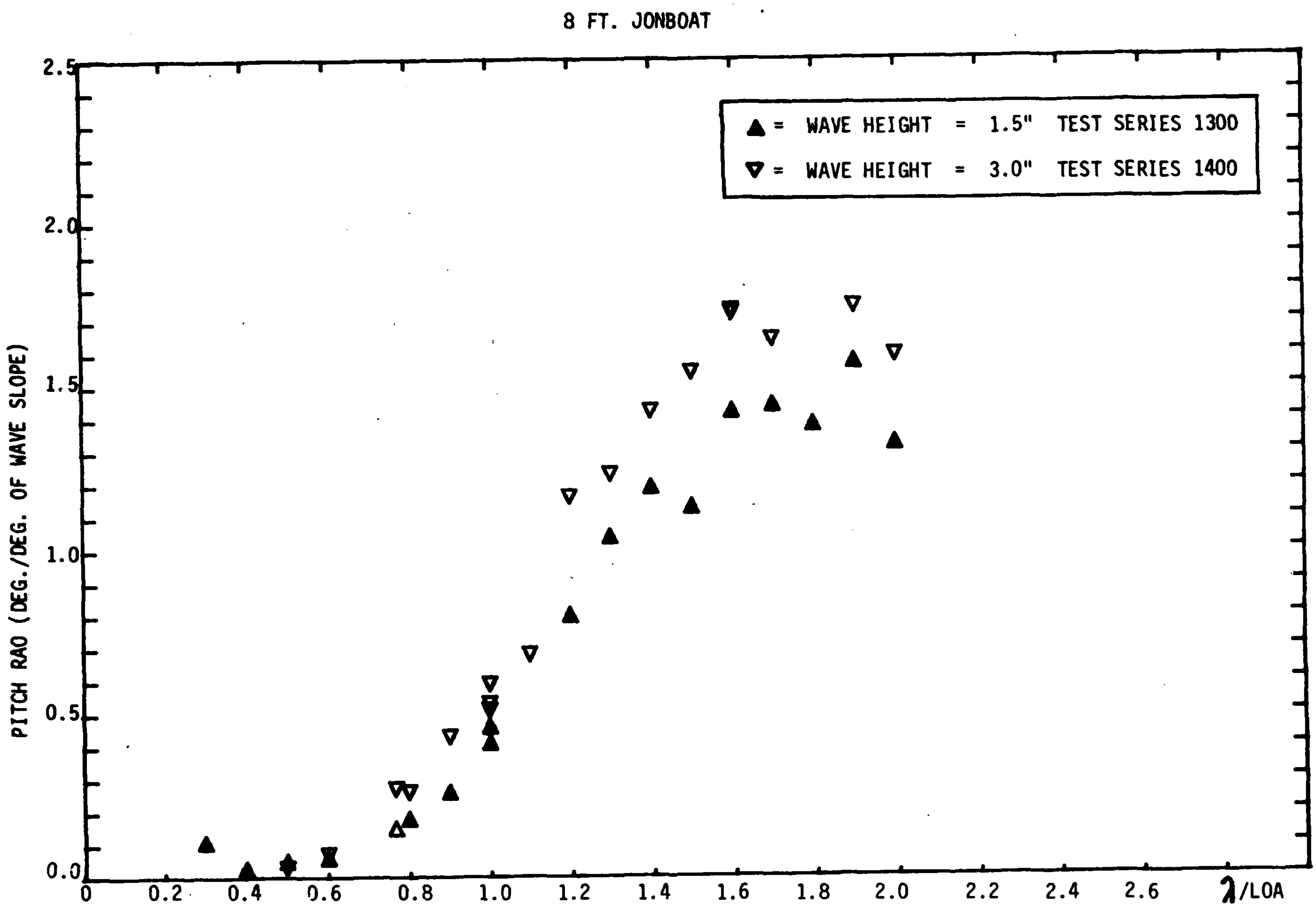

Figure 20 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

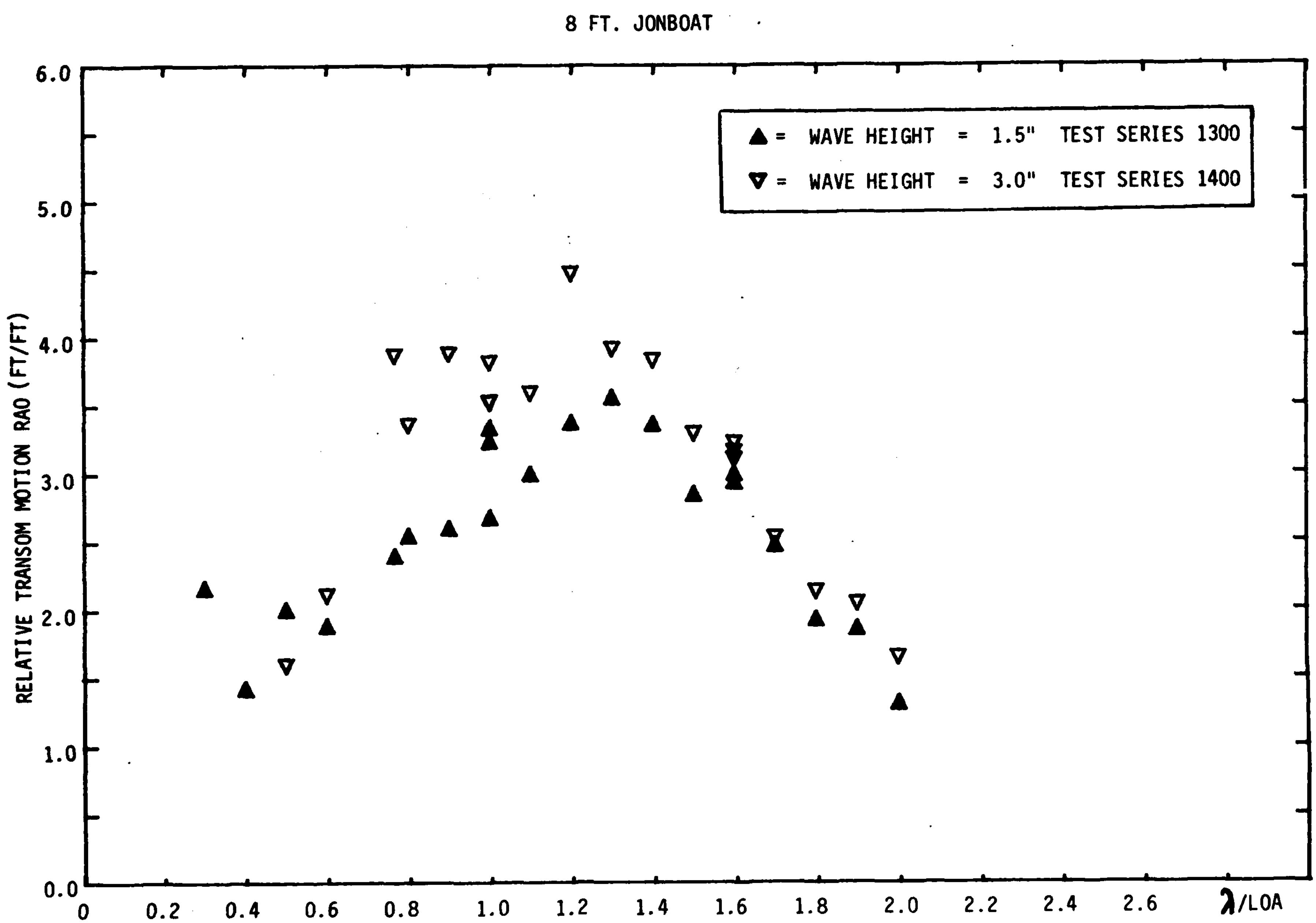

Figure 20 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

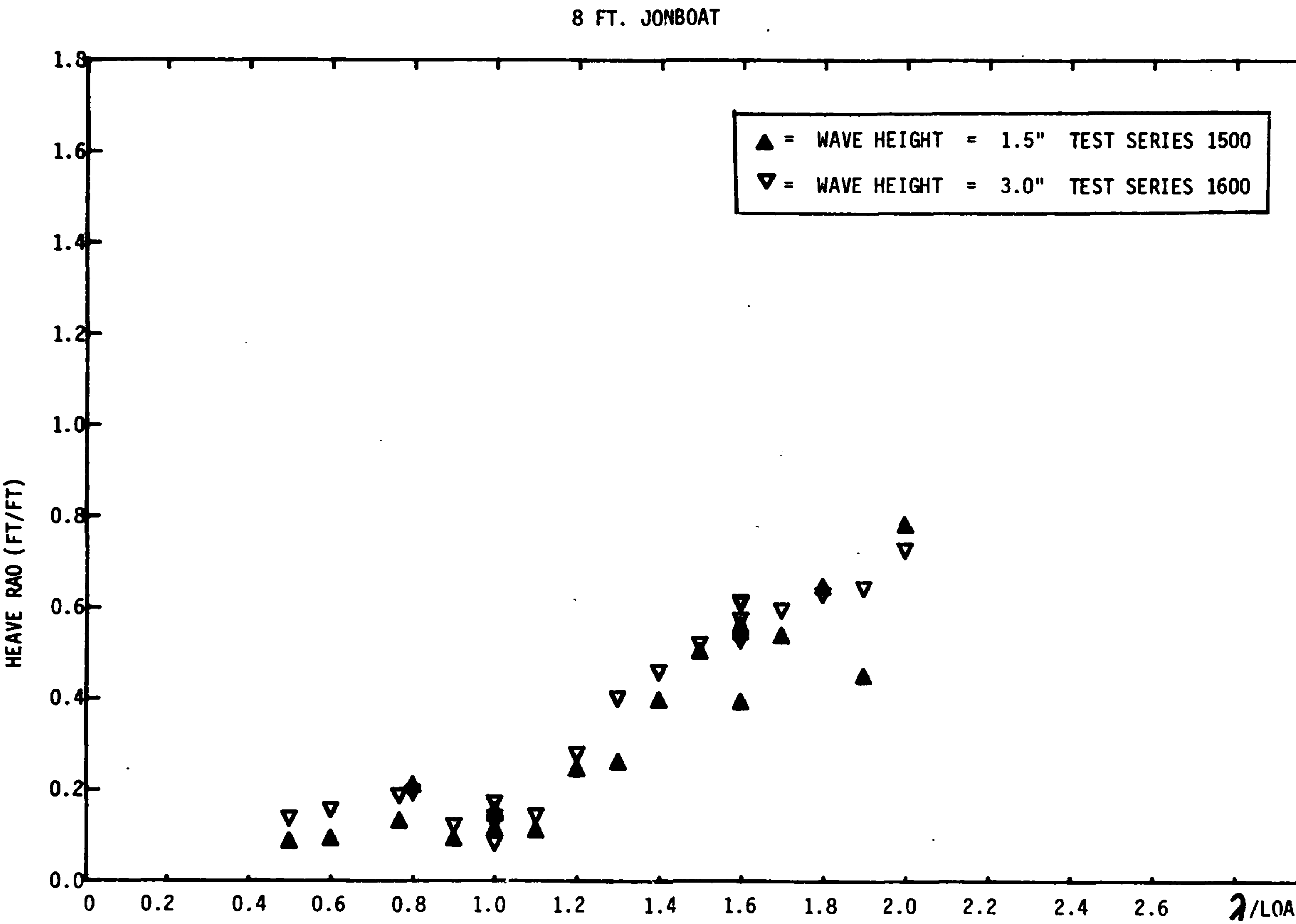

Figure 21 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, EVEN KEEL

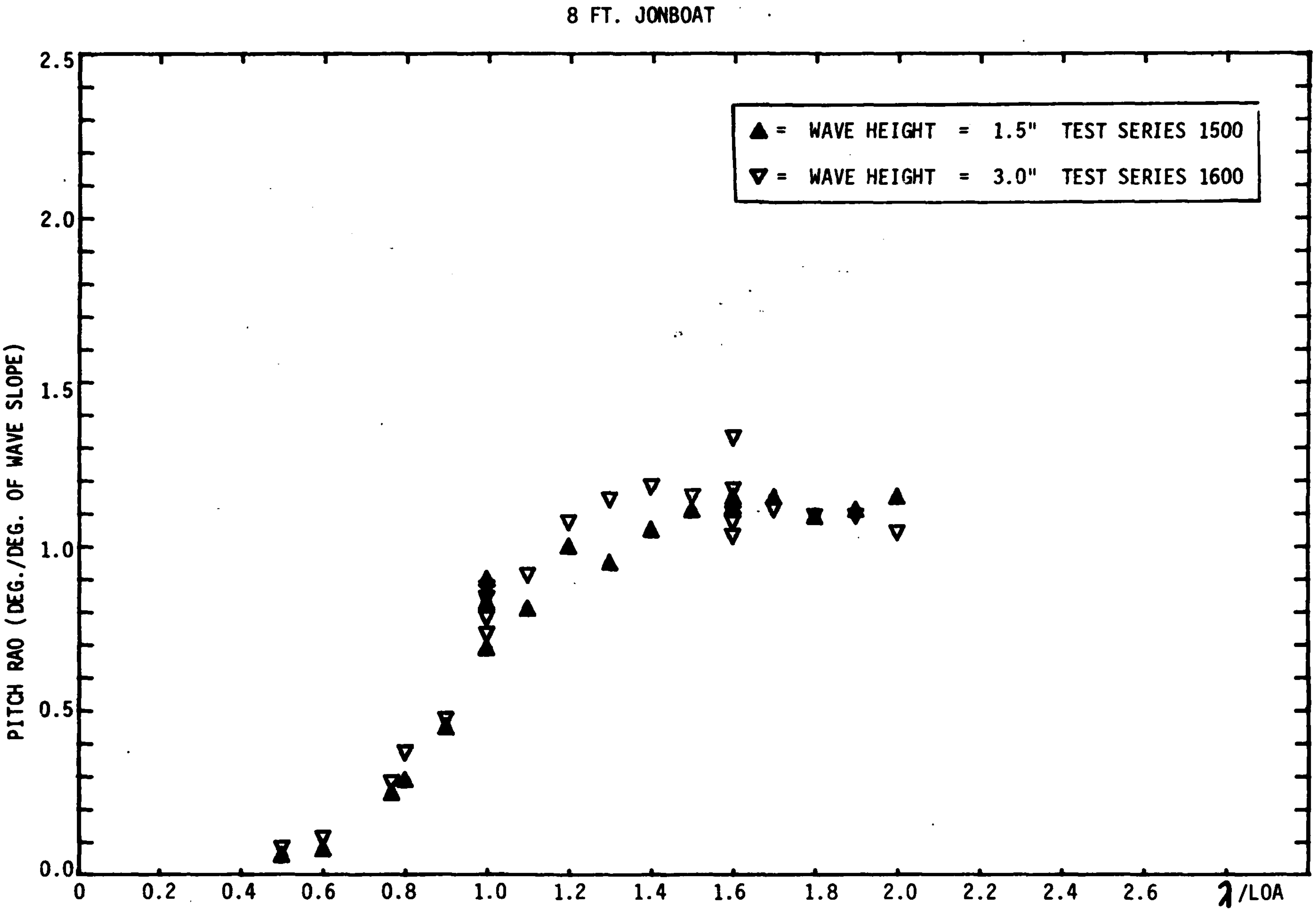

Figure 21 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, EVEN KEEL

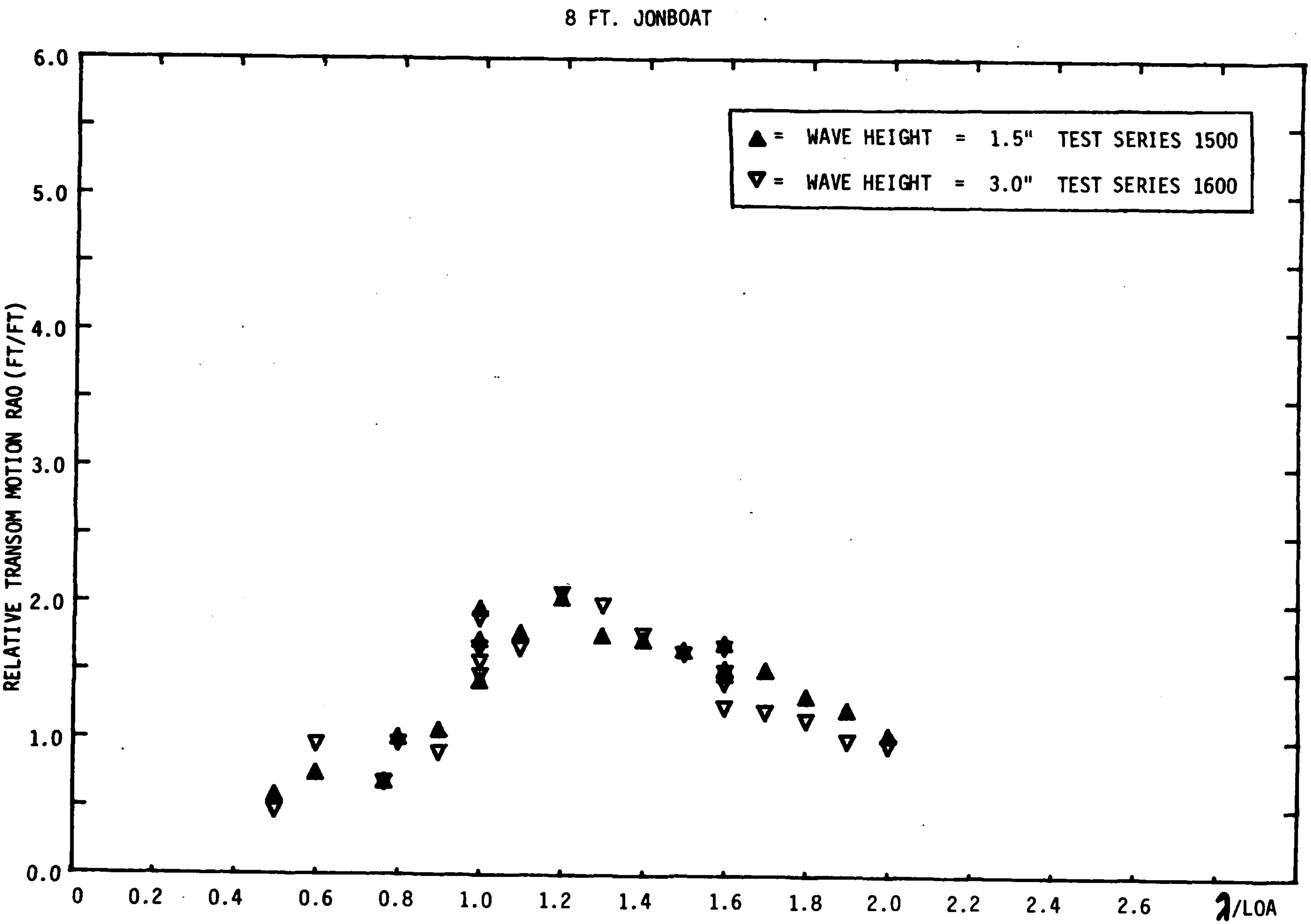

Figure 21 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, EVEN KEEL

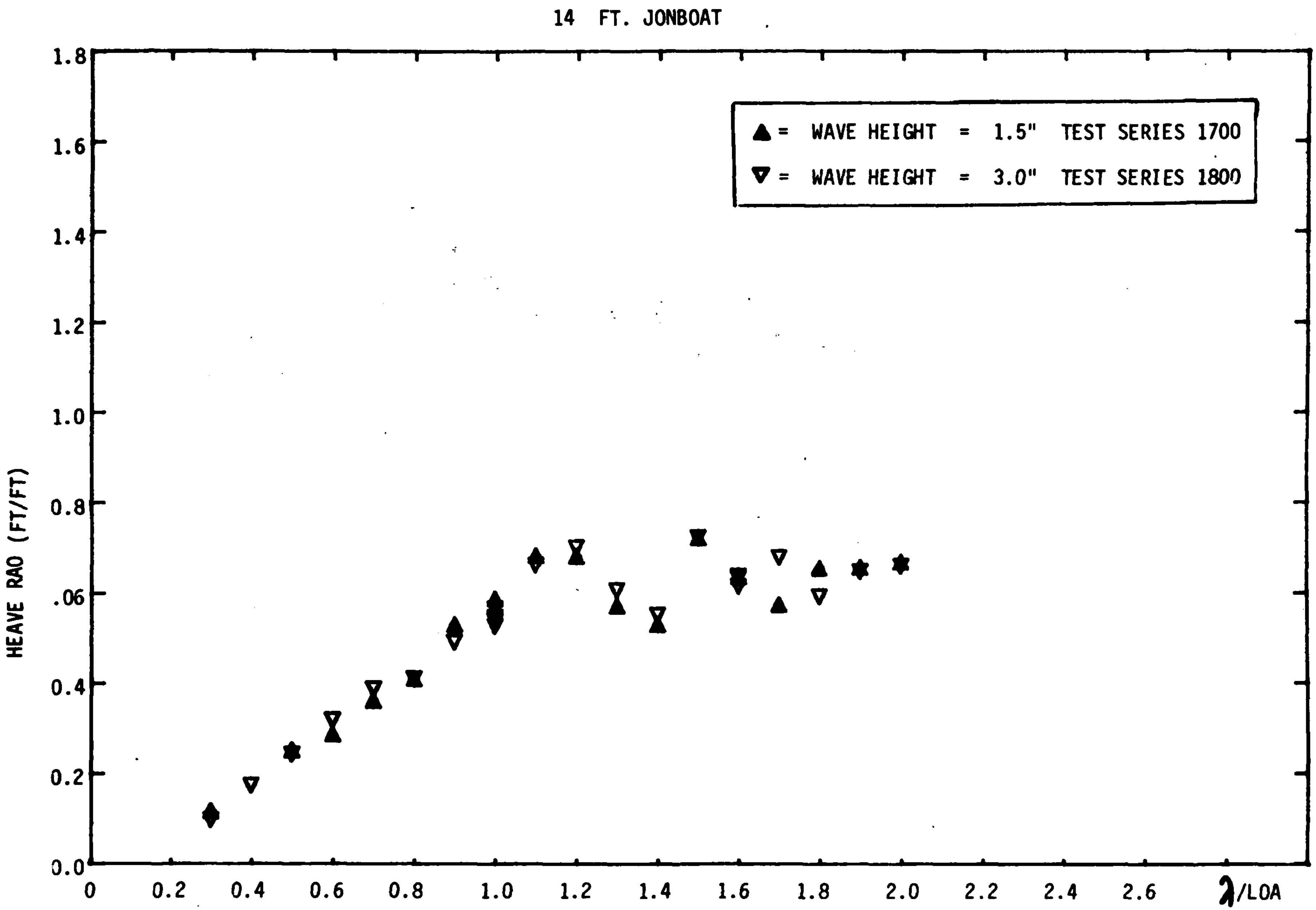

Figure 22 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP

14 FT. JONBOAT

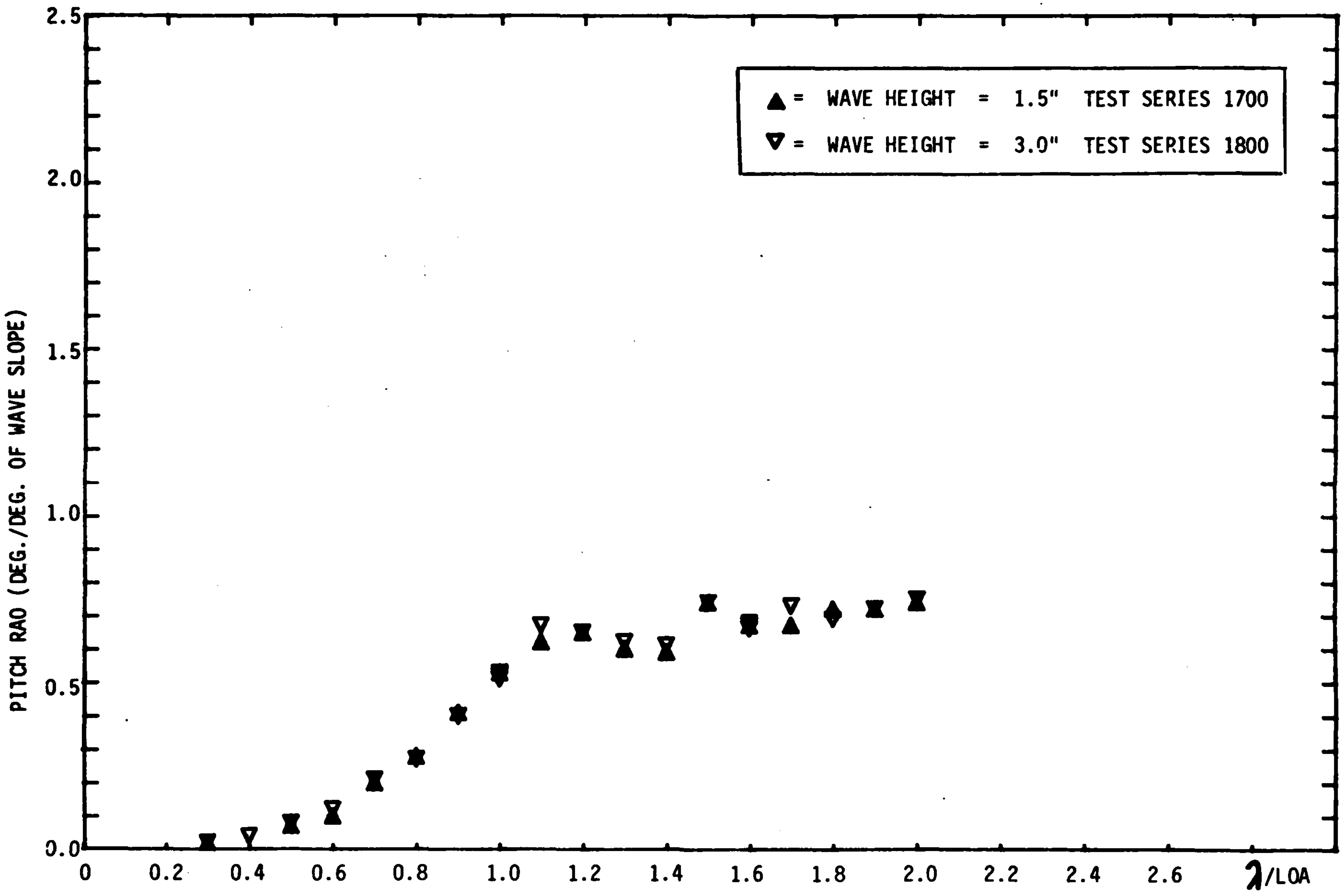

Figure 22 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP

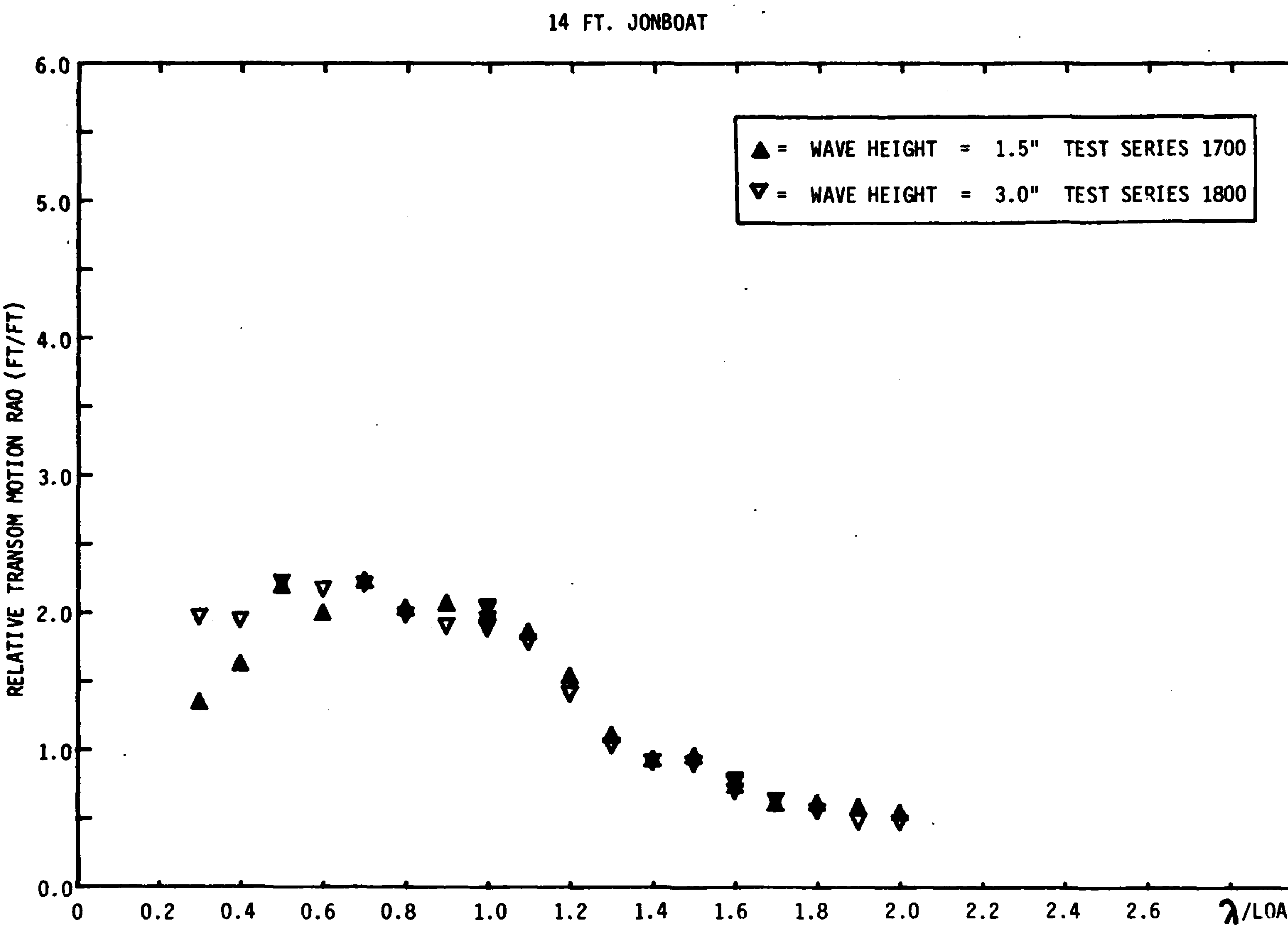

Figure 22 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP

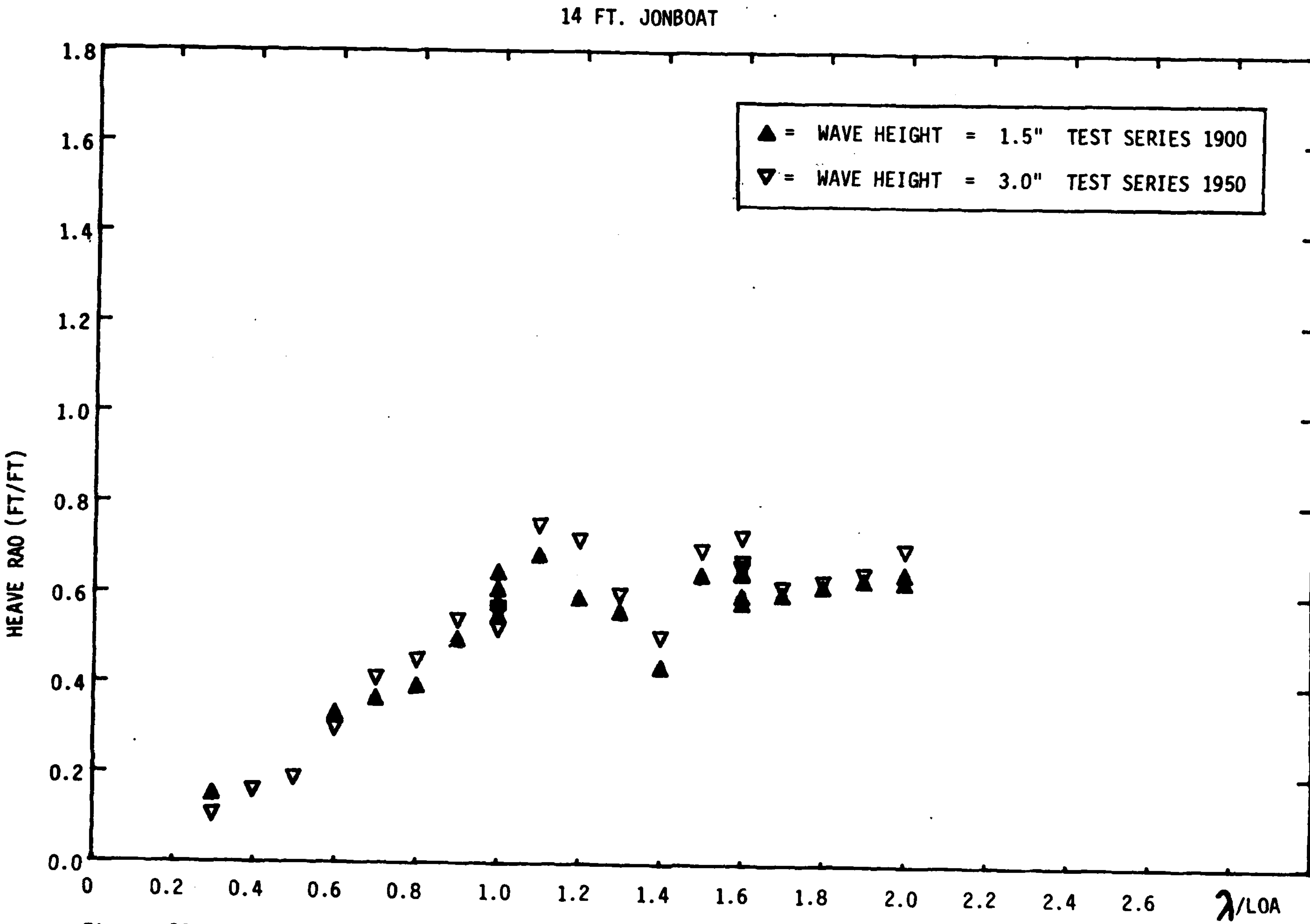

Figure 23 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP

14 FT. JONBOAT

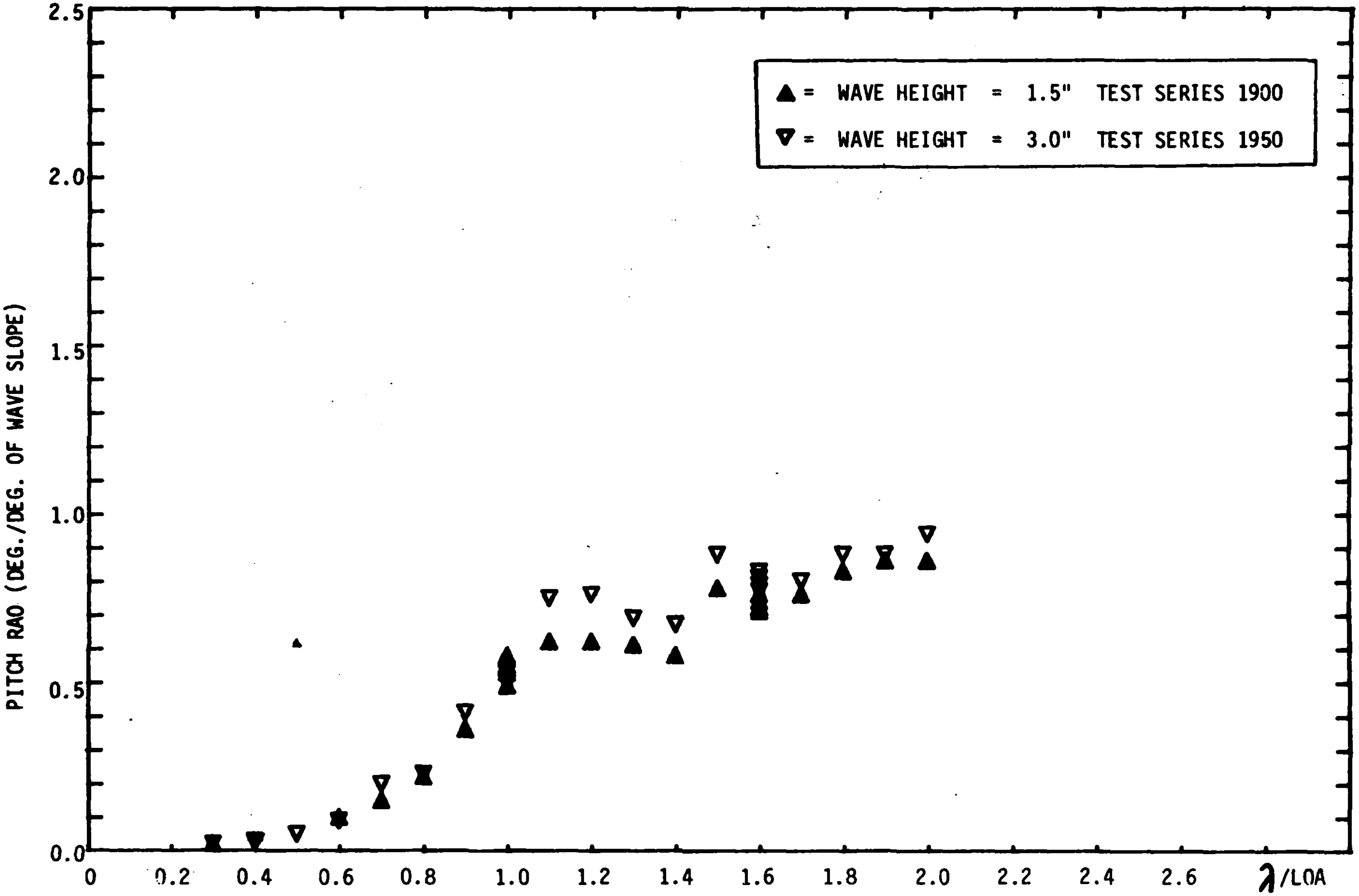

Figure 23 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP

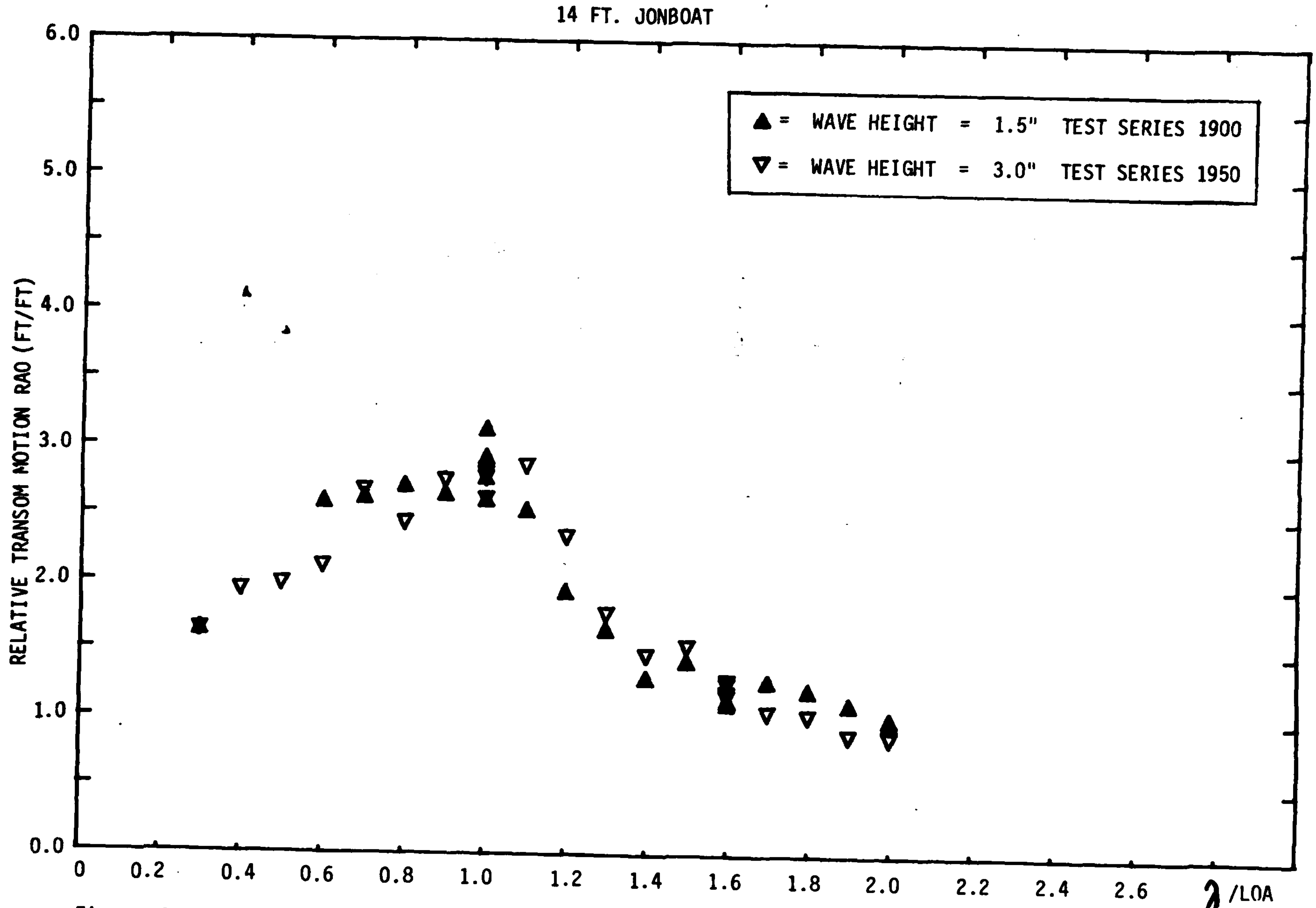

Figure 23 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, HEAD WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP

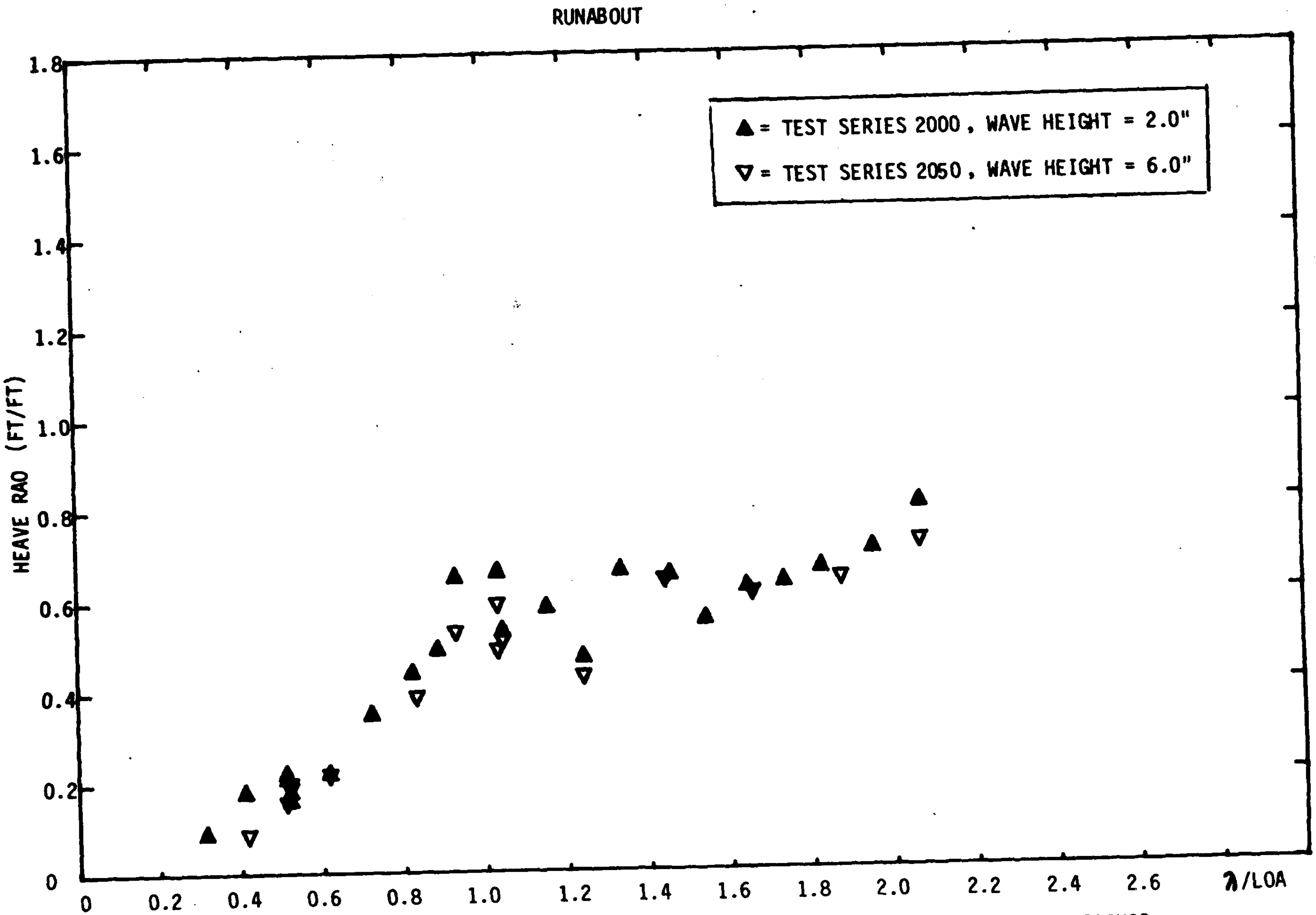

FIGURE 24 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT and 2 MEN MIDSHIP

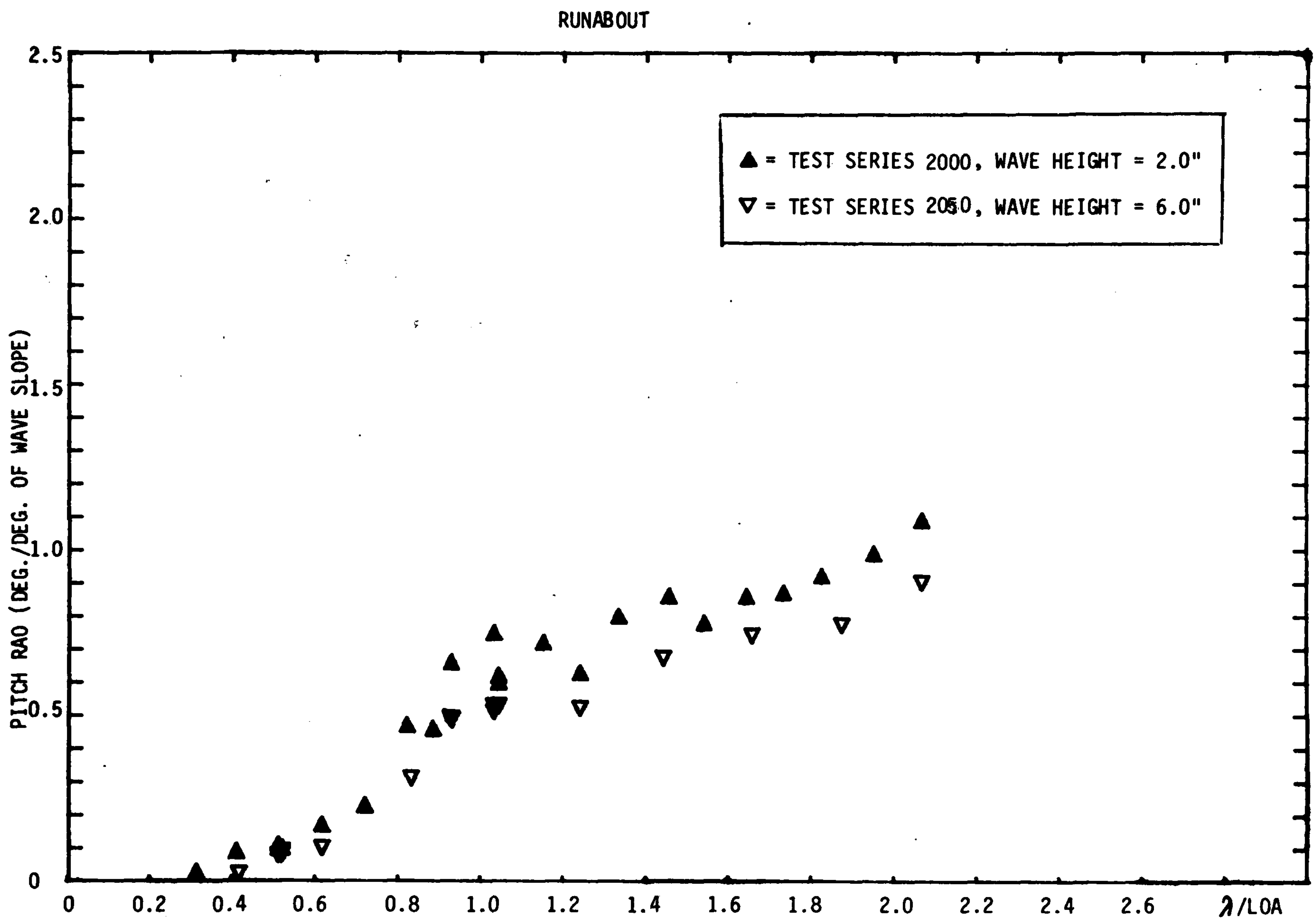

FIGURE 24 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT and 2 MEN MIDSHIP

RUNABOUT

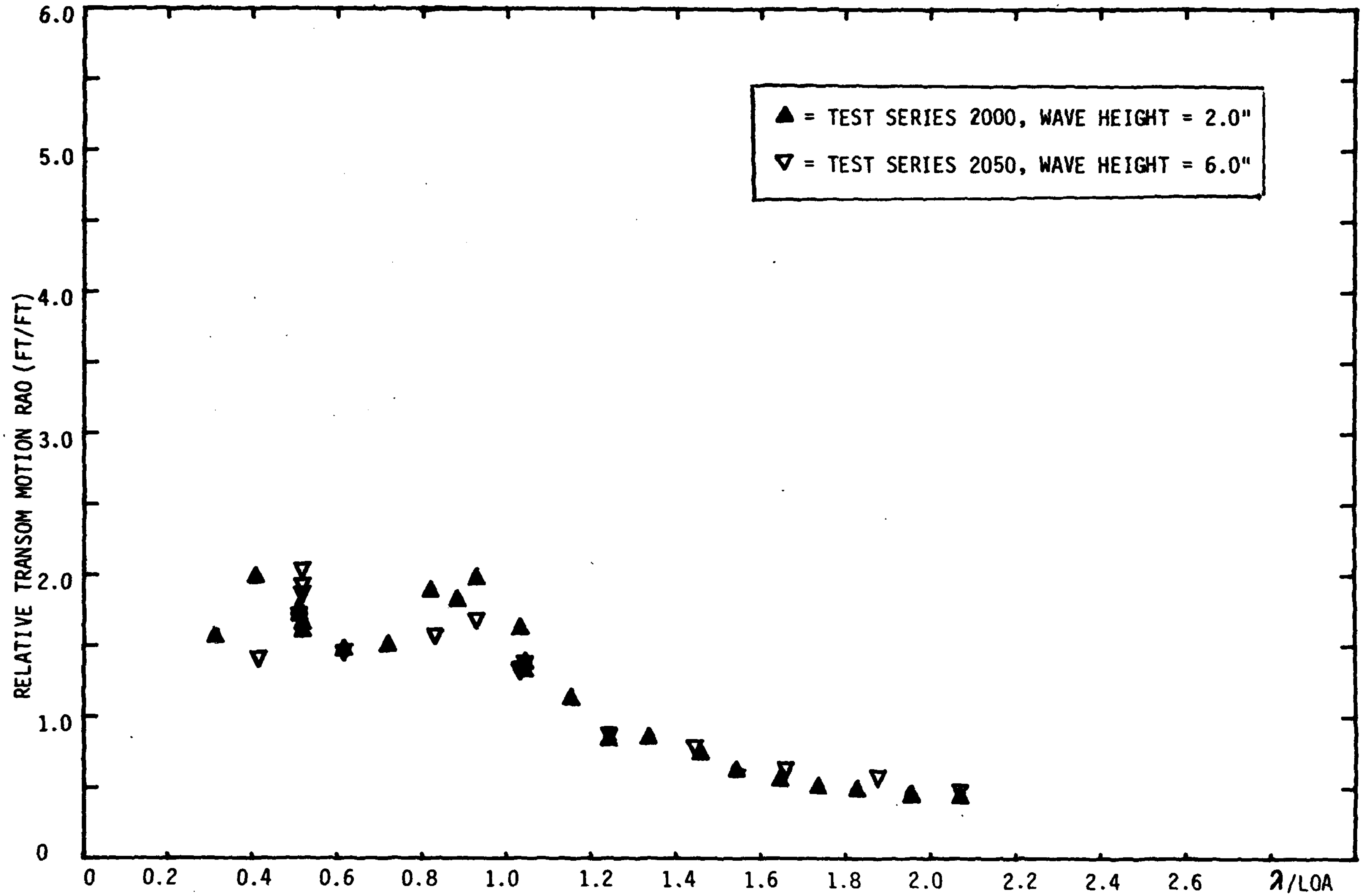

FIGURE 24 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT & 2 MIDSHIP

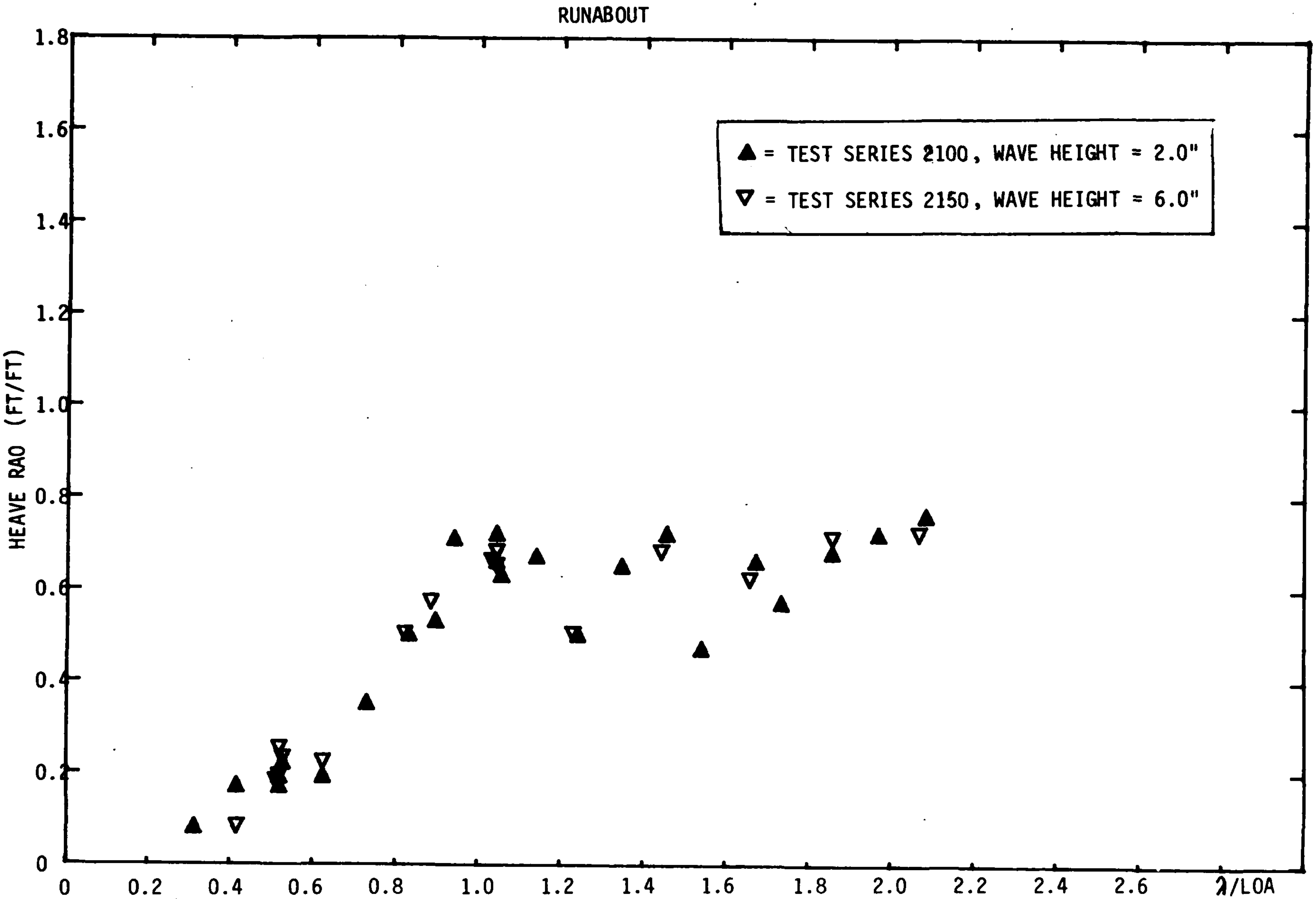

FIGURE 25 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT

RUNABOUT

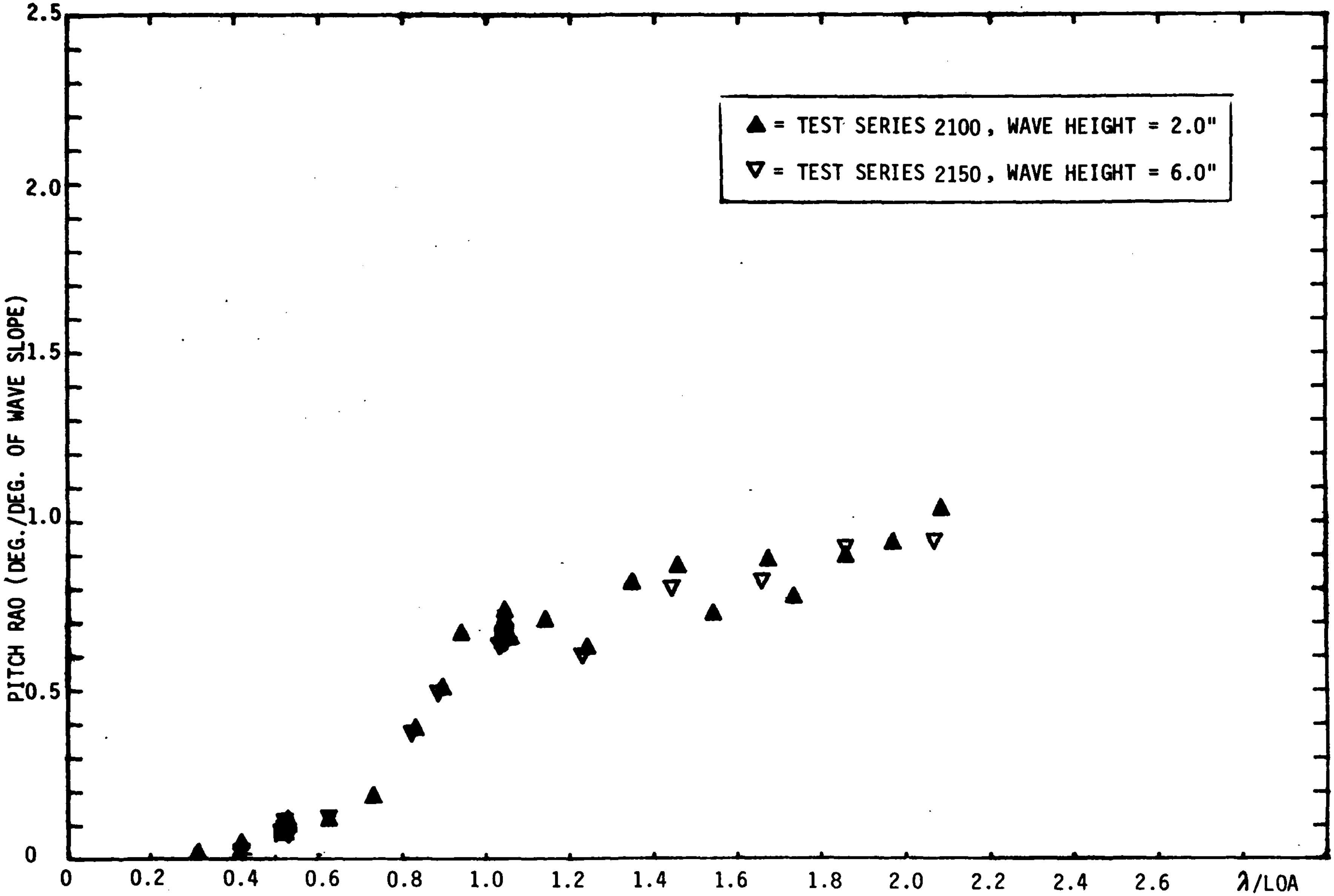

FIGURE 25 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT

RUNABOUT

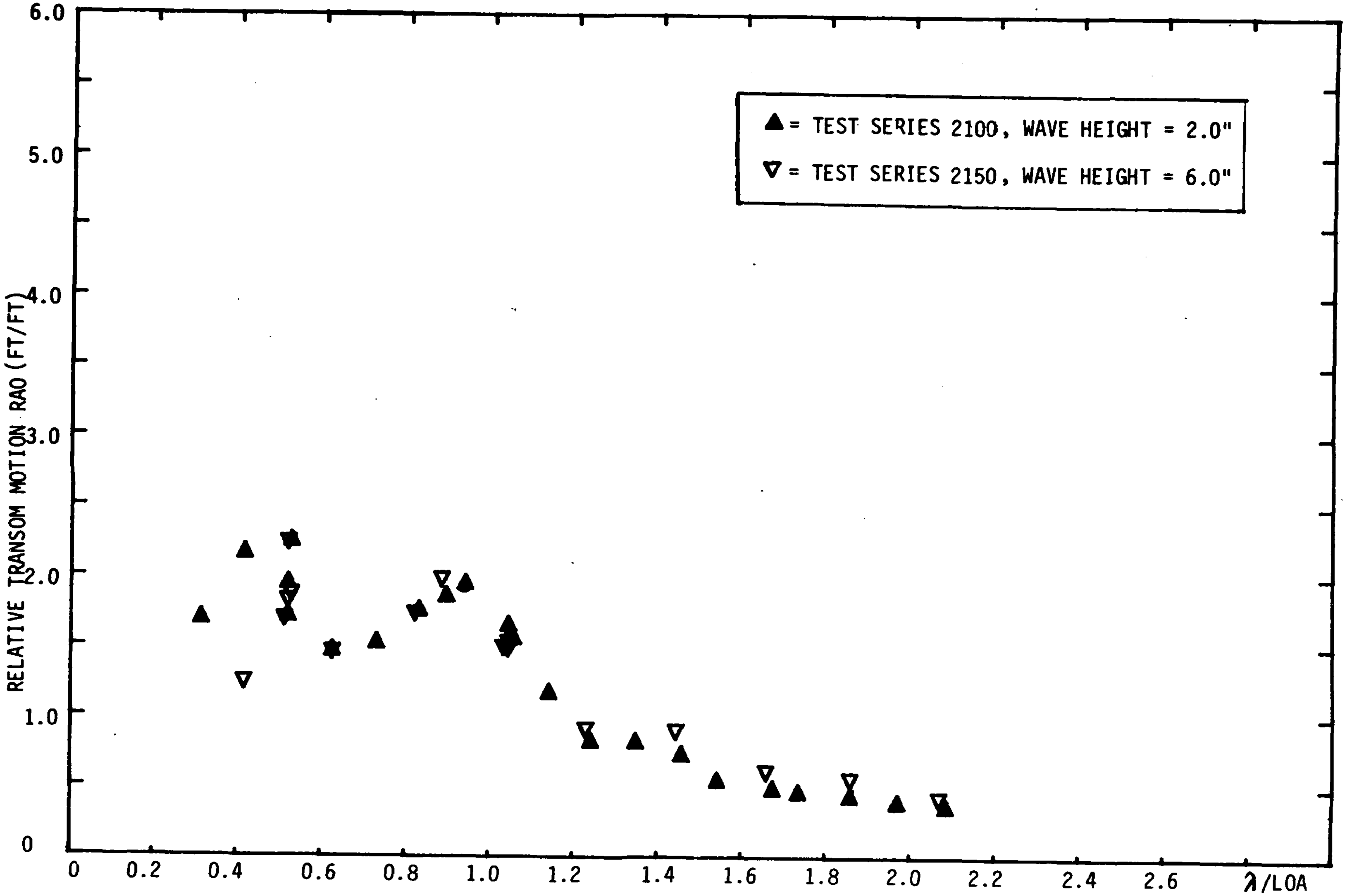

FIGURE 25 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 3 MEN AFT

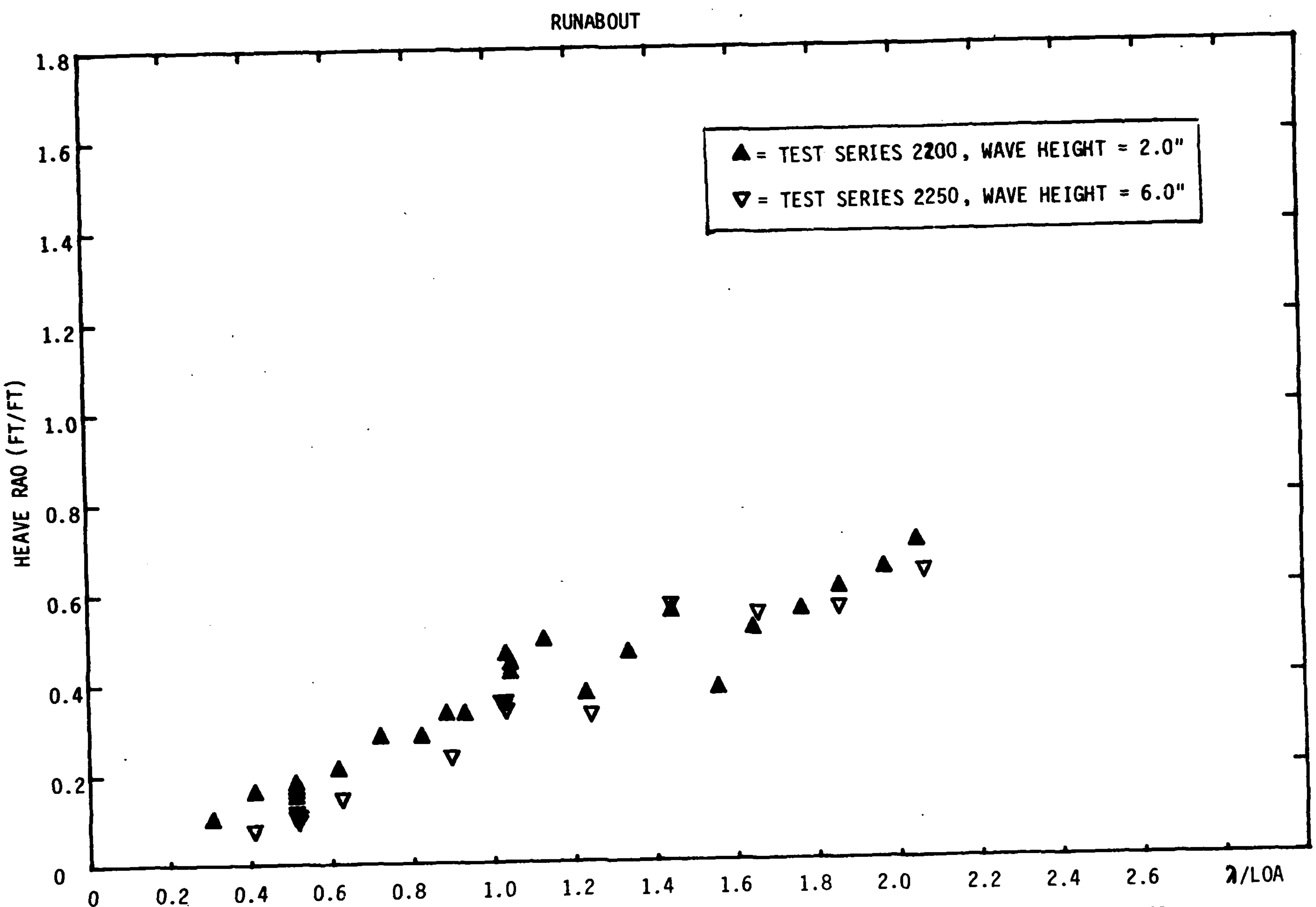

FIGURE 26 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 2 MEN FORWARD and 2 MEN MIDSHIP

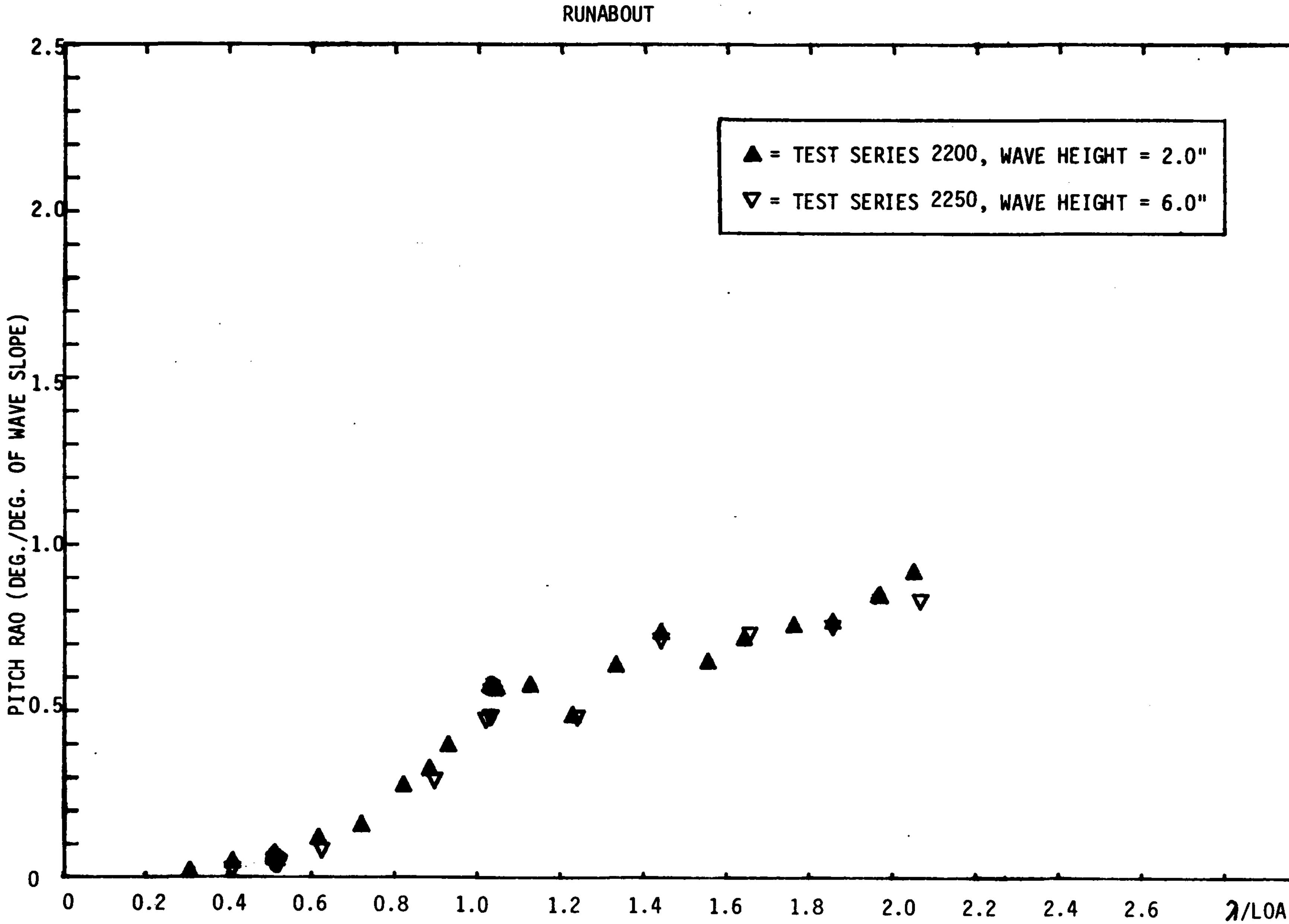

FIGURE 26 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 2 MEN FORWARD and 2 MEN MIDSHIP

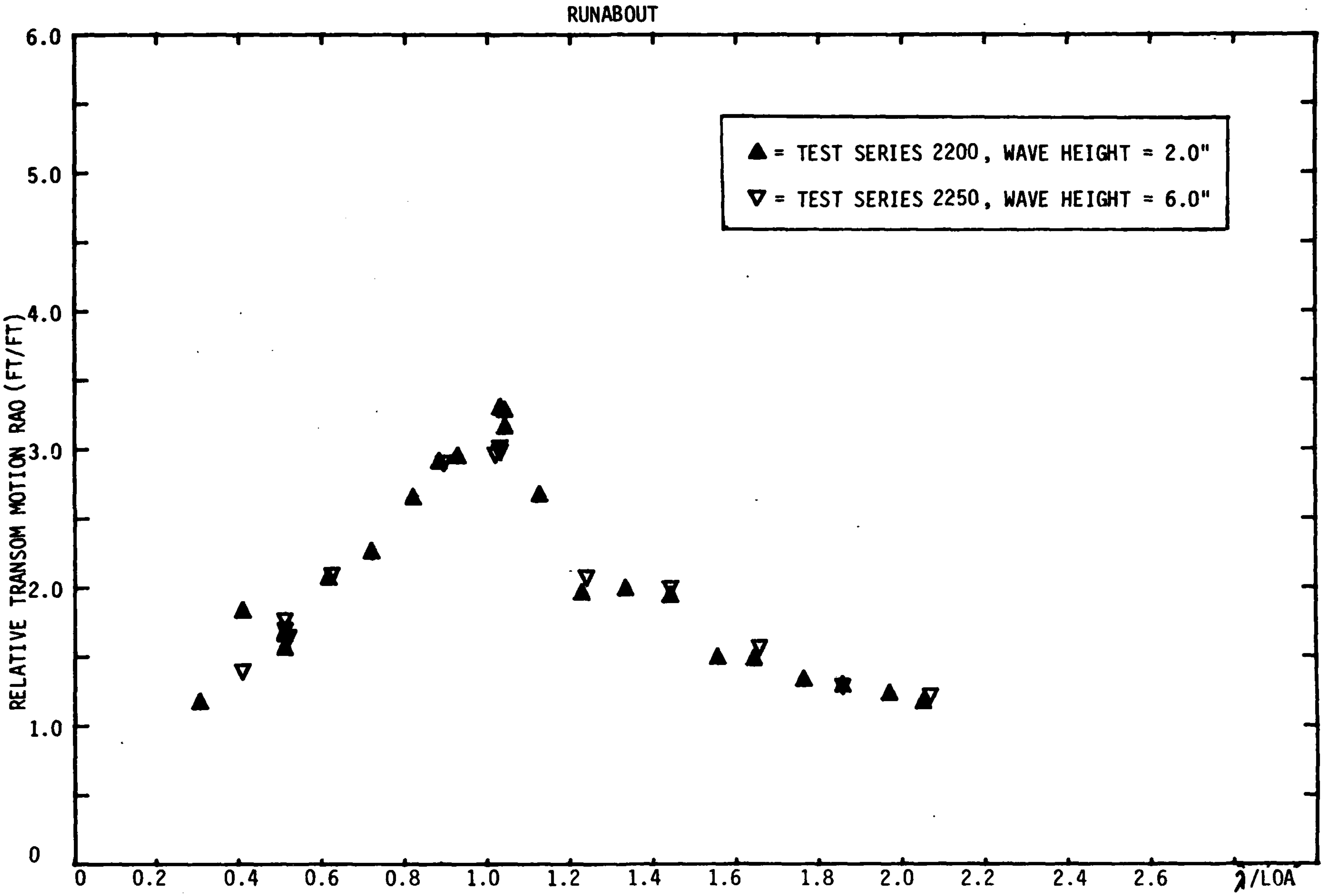

FIGURE 26 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 2 MEN FORWARD & 2 MIDSHIP

SKIFF

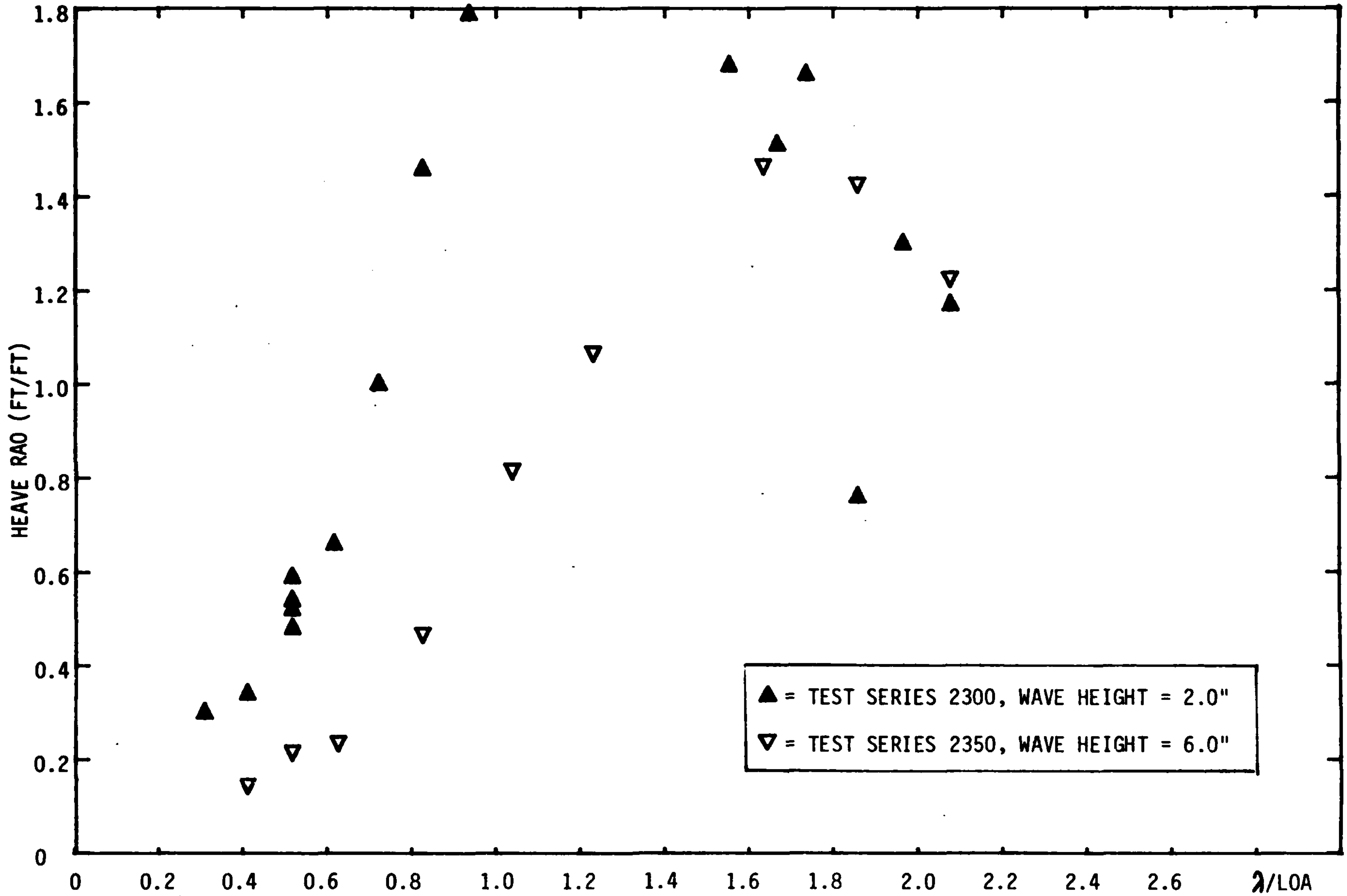

FIGURE 27 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP

SKIFF

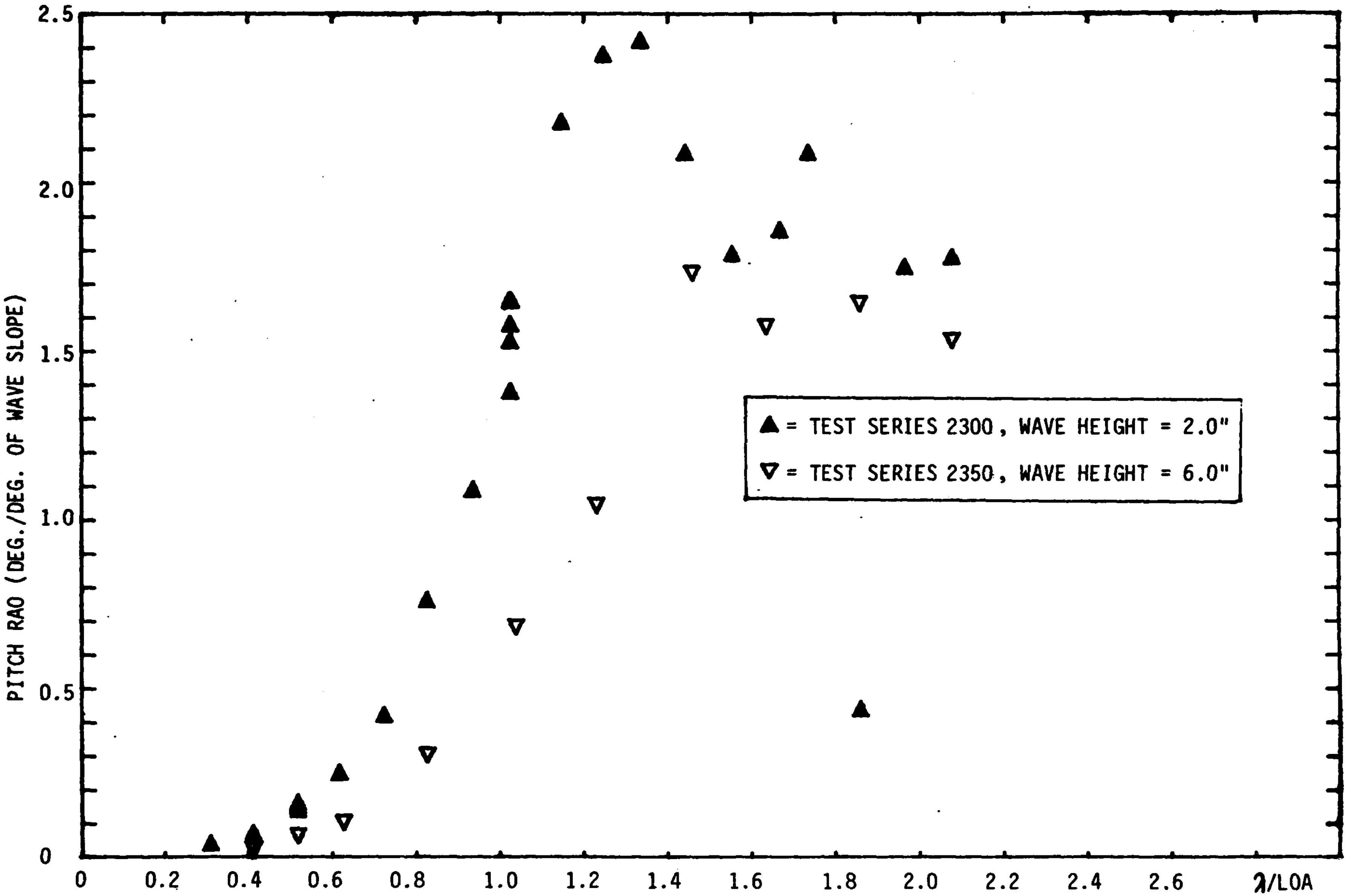

FIGURE 27 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP

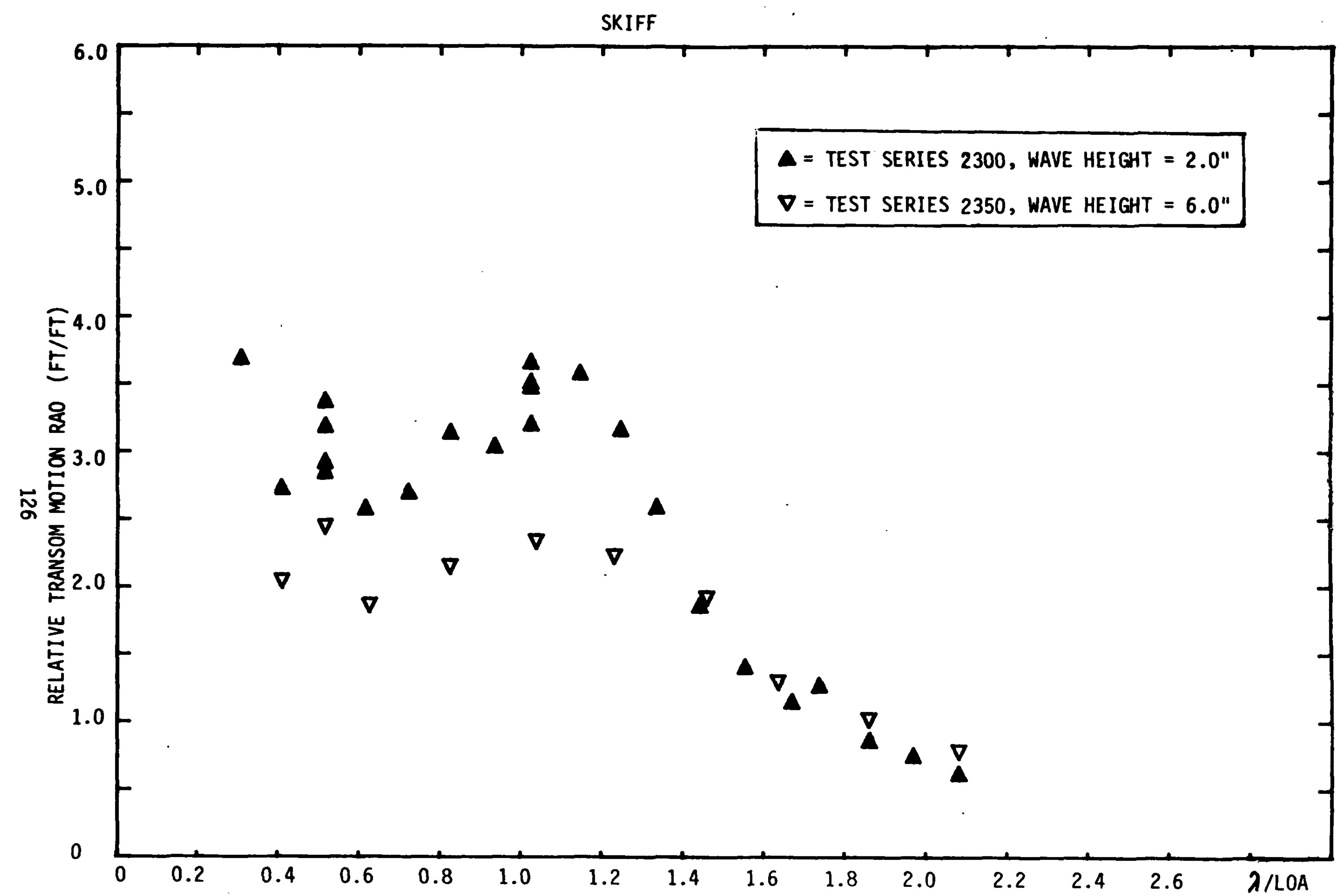

FIGURE 27 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 2 MEN AFT & 1 MIDSHIP

SKIFF

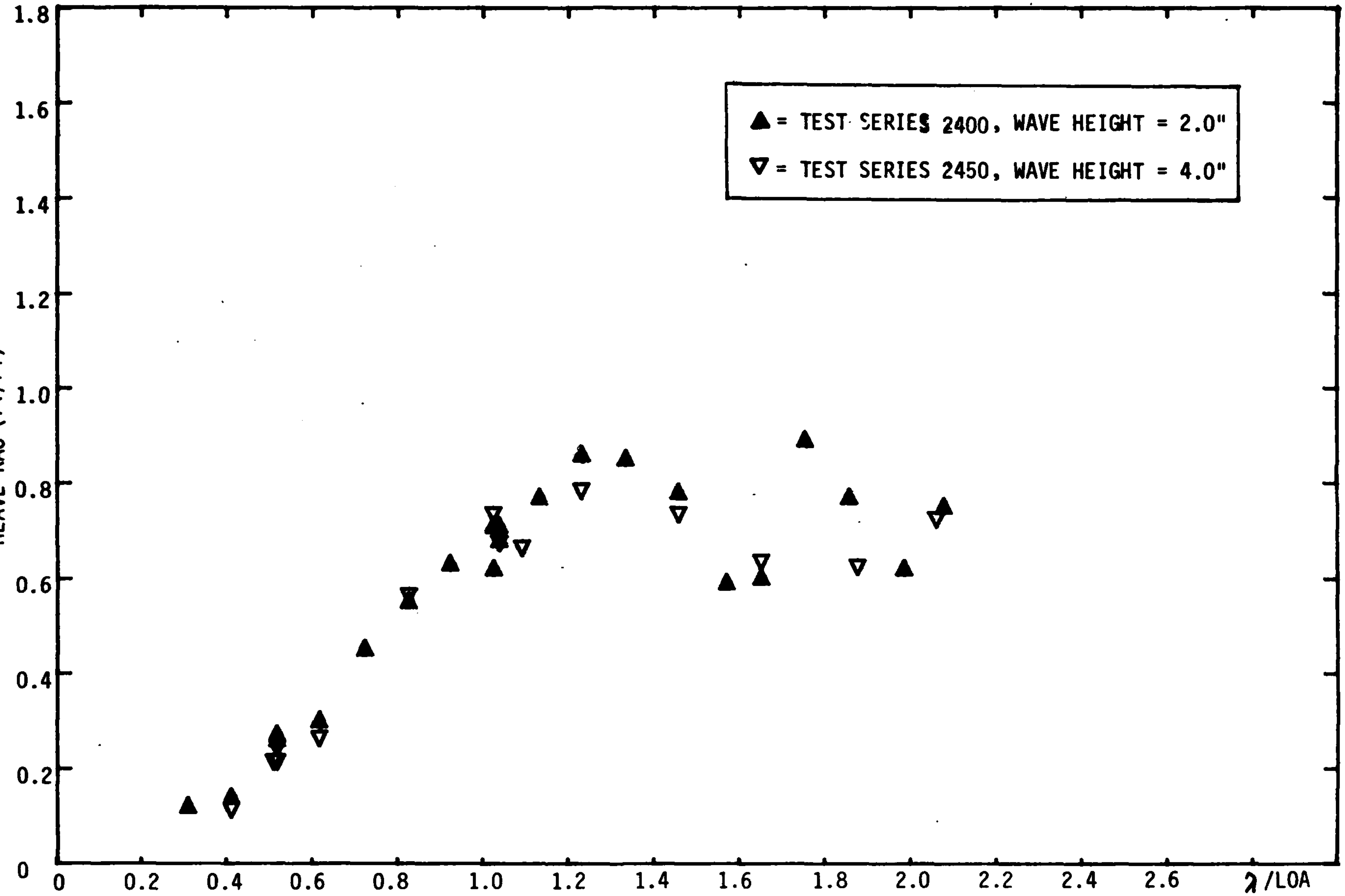

FIGURE 28 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

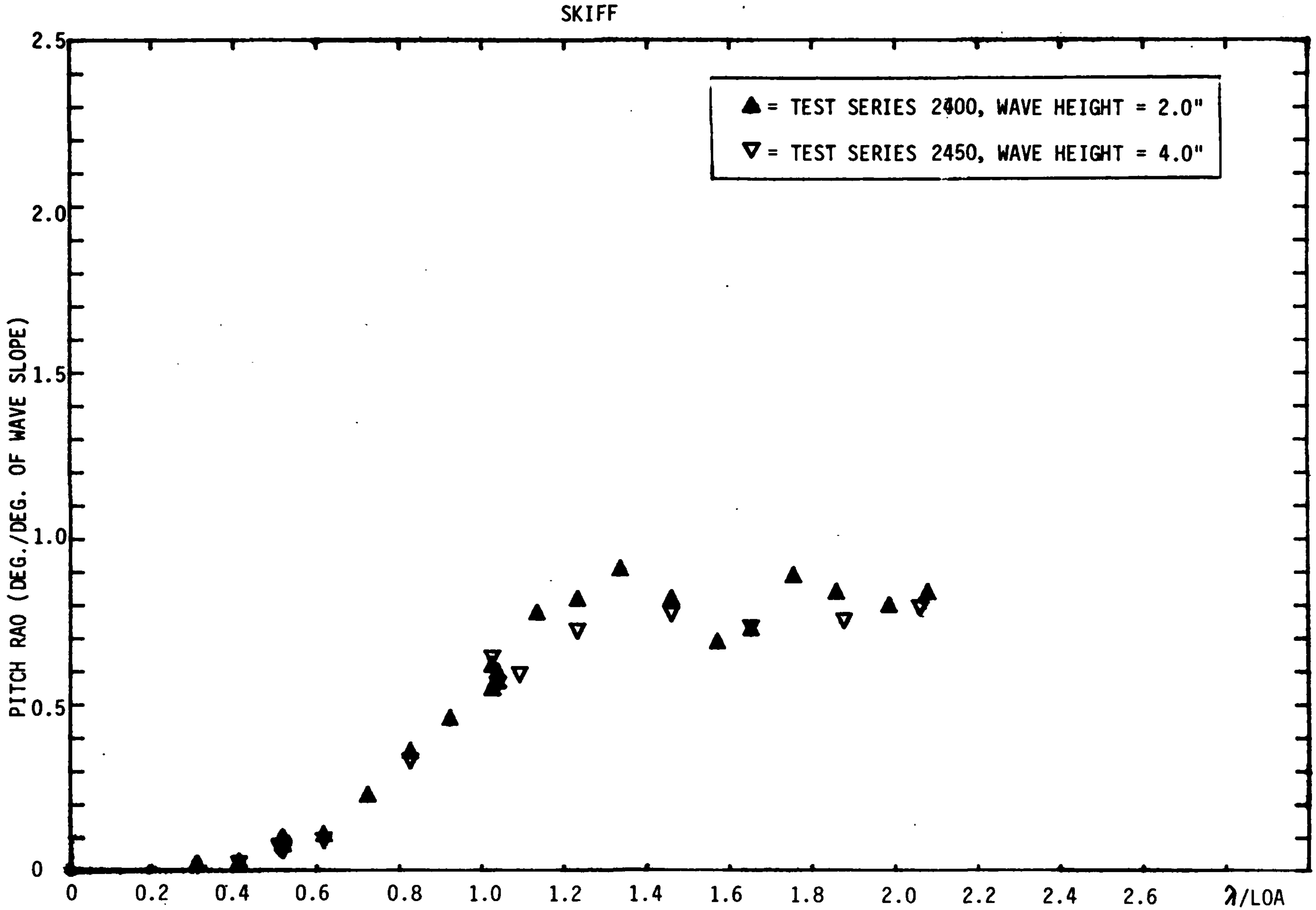

FIGURE 28 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

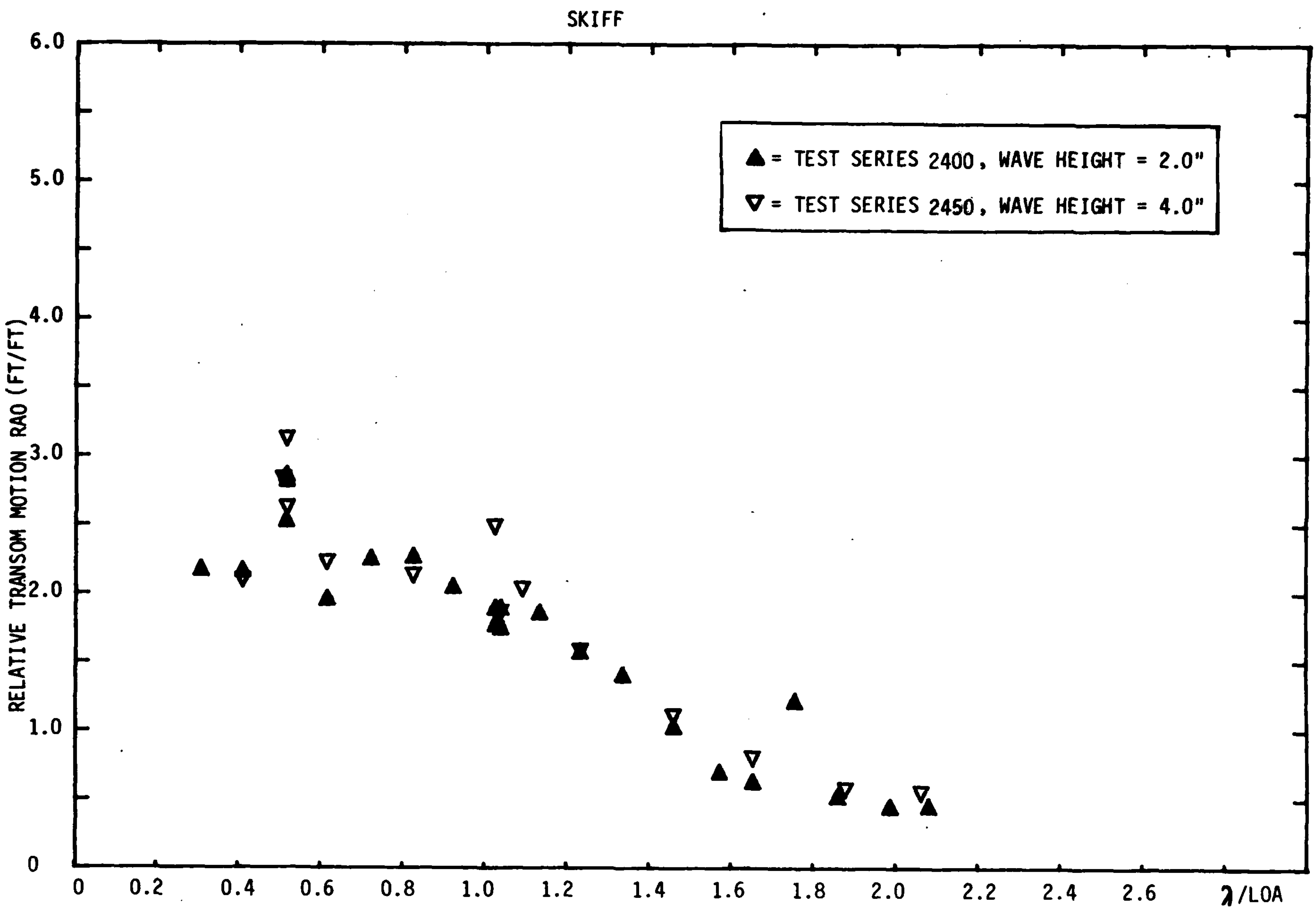

FIGURE 28 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT & 1 MIDSHIP

SKIFF

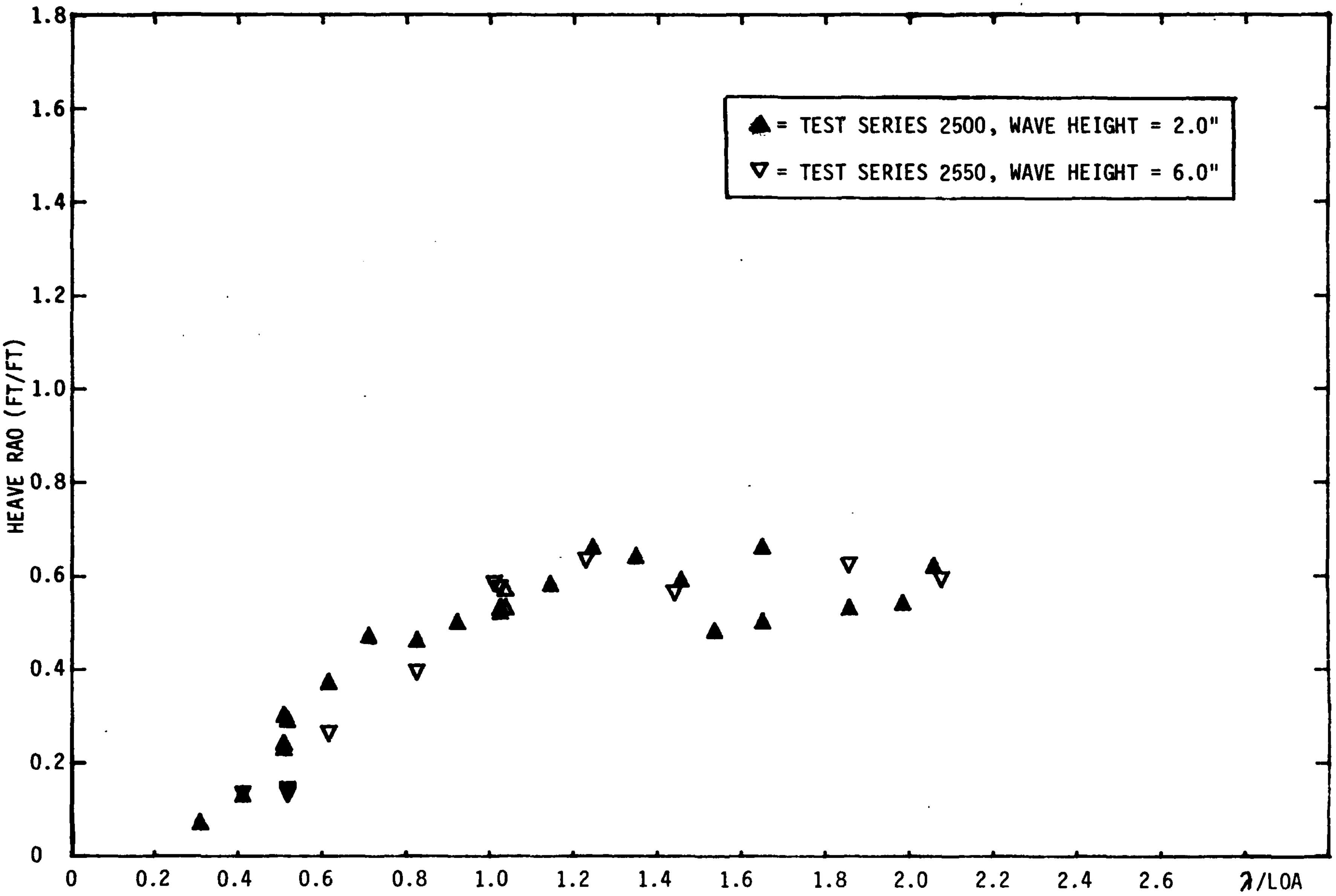

FIGURE 29 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP

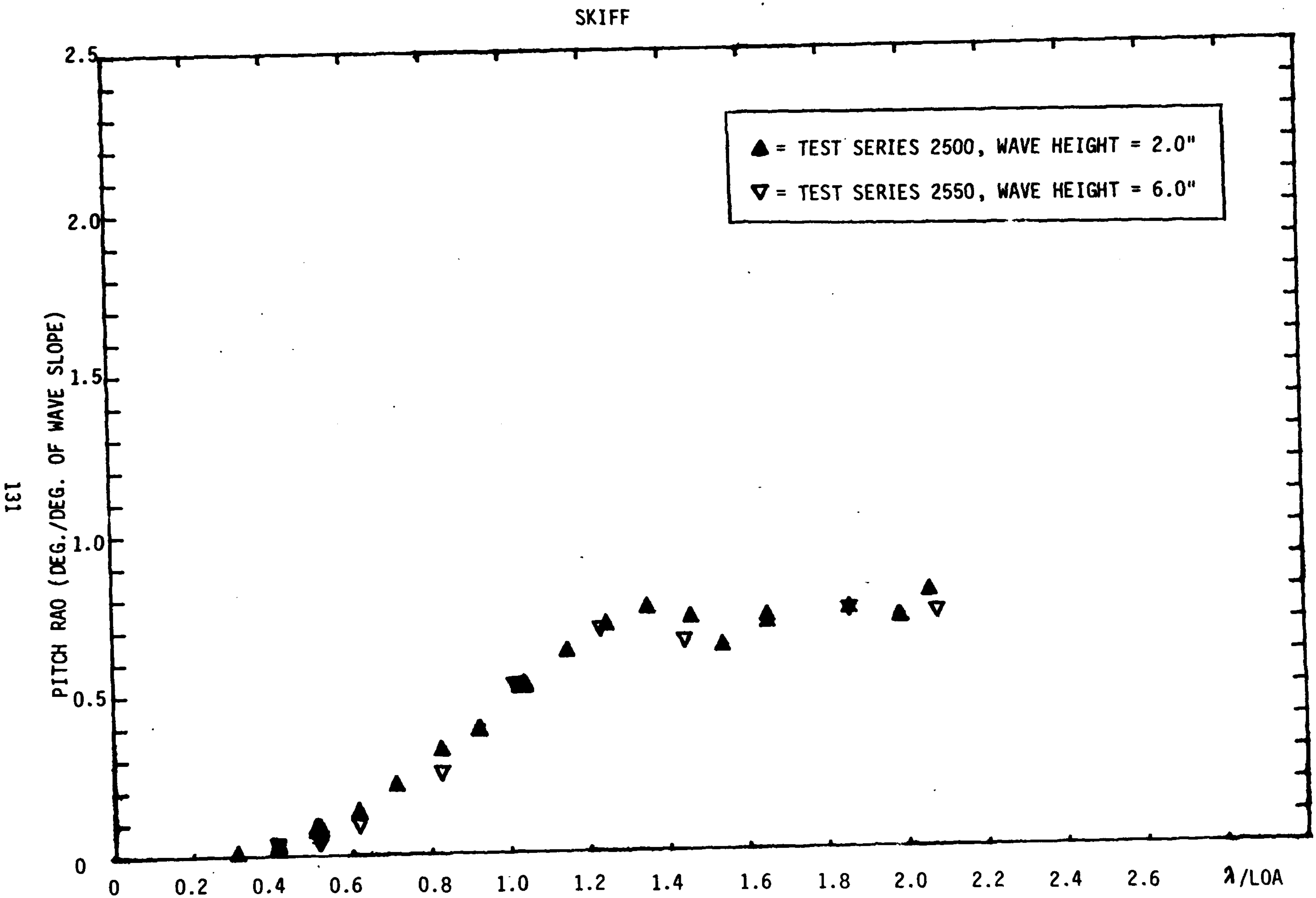

FIGURE 29 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP

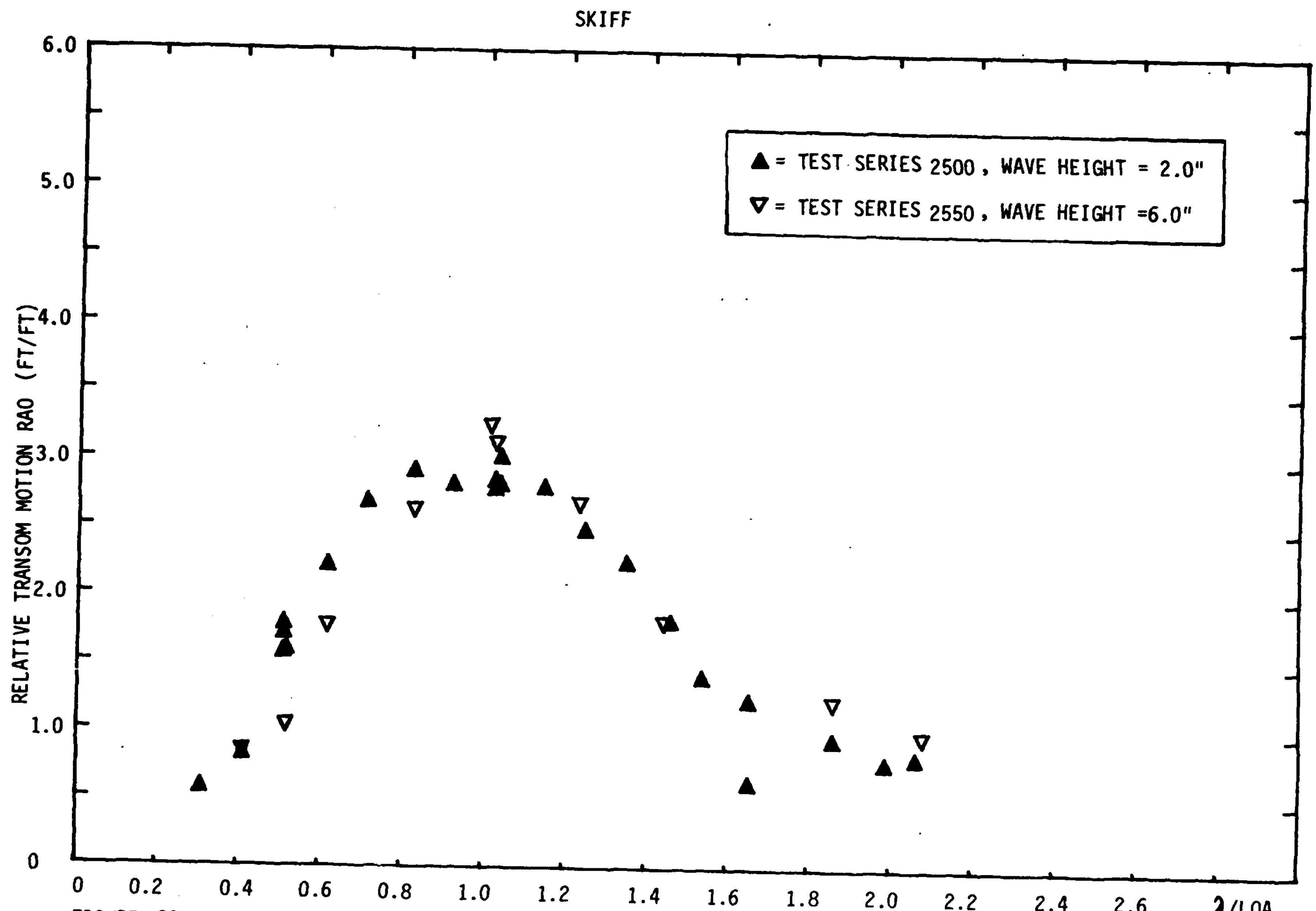

FIGURE 29 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 1 MAN FORWARD & 1 MIDSHIP

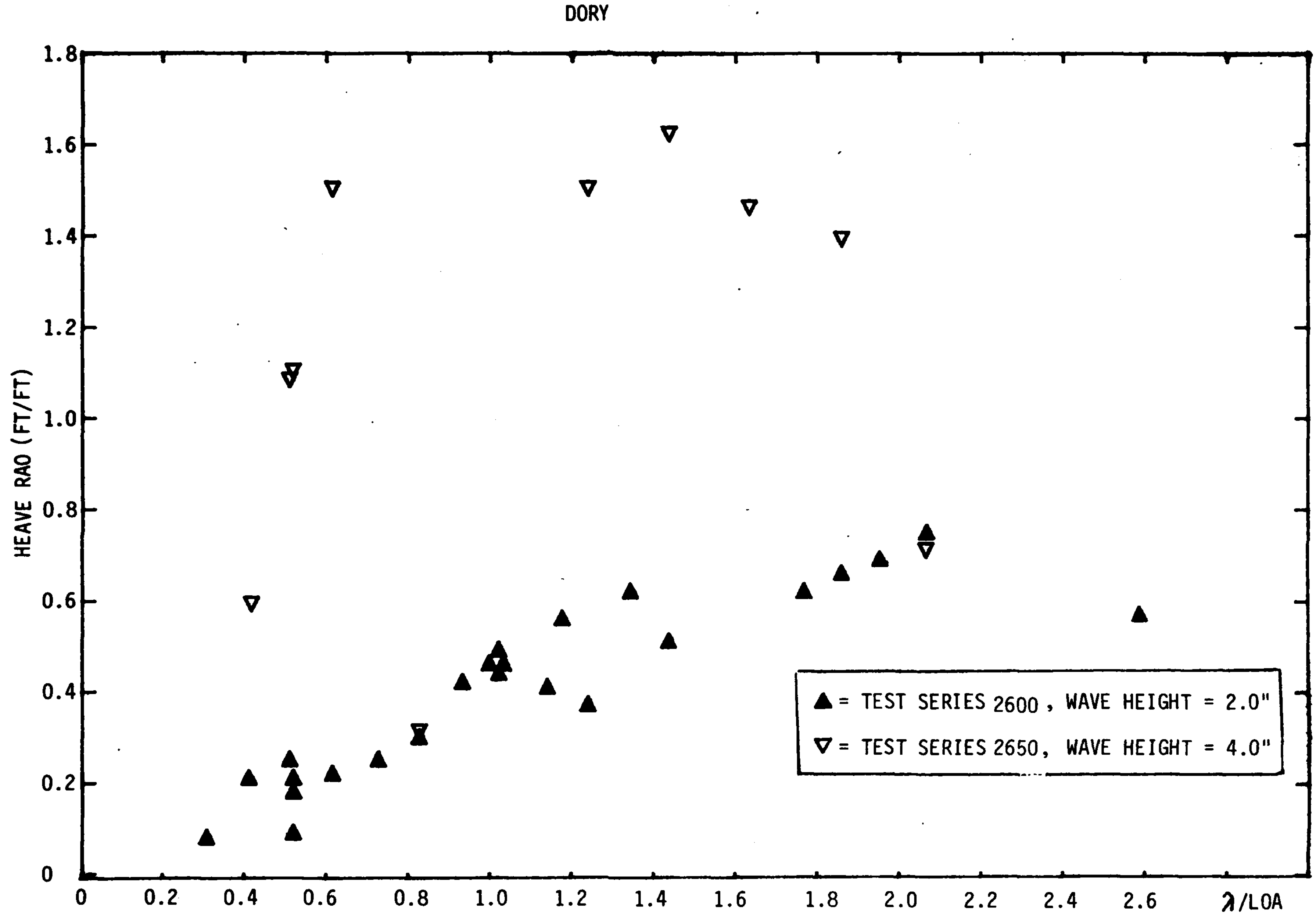

FIGURE 30 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

DORY

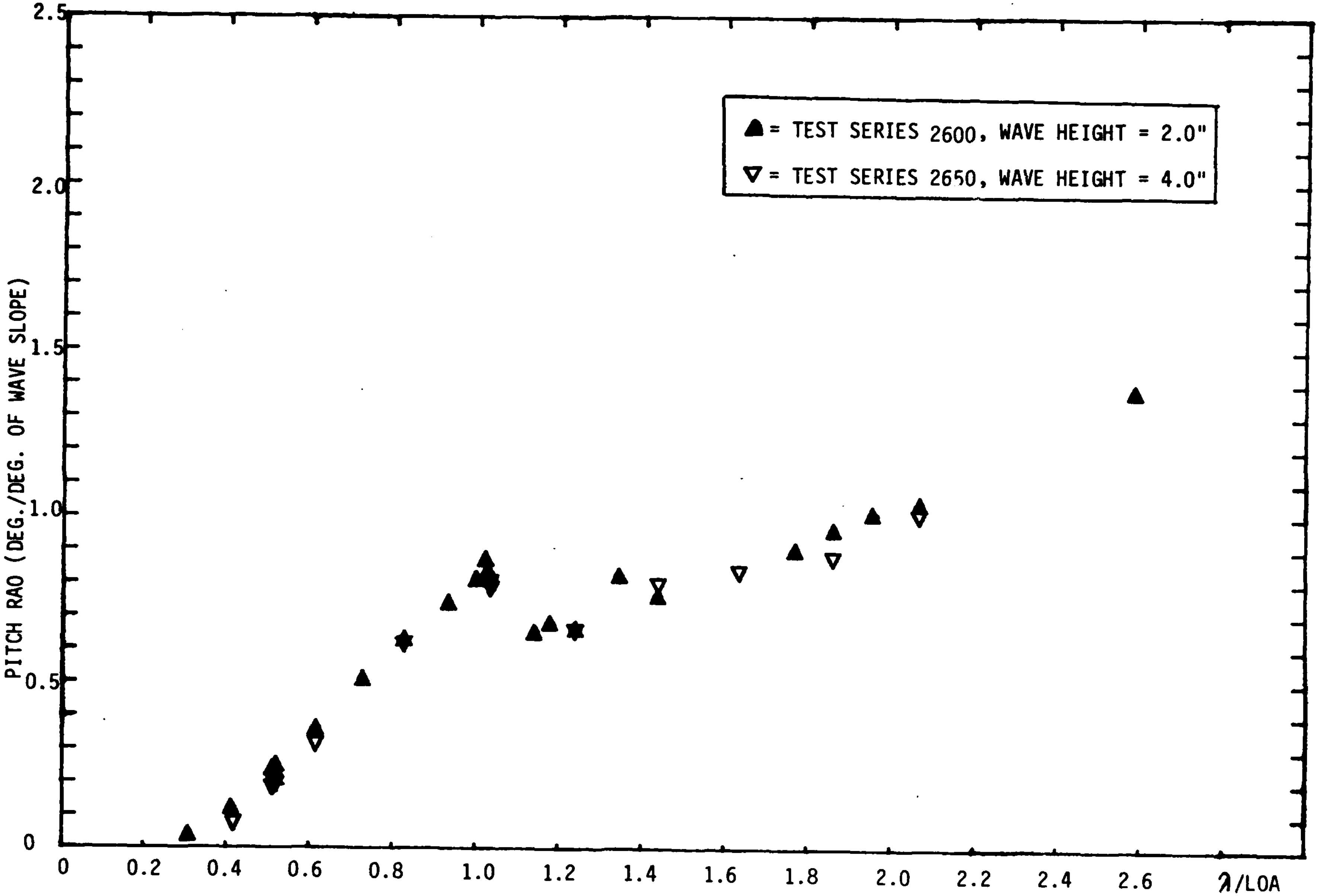

FIGURE 30 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP

DORY

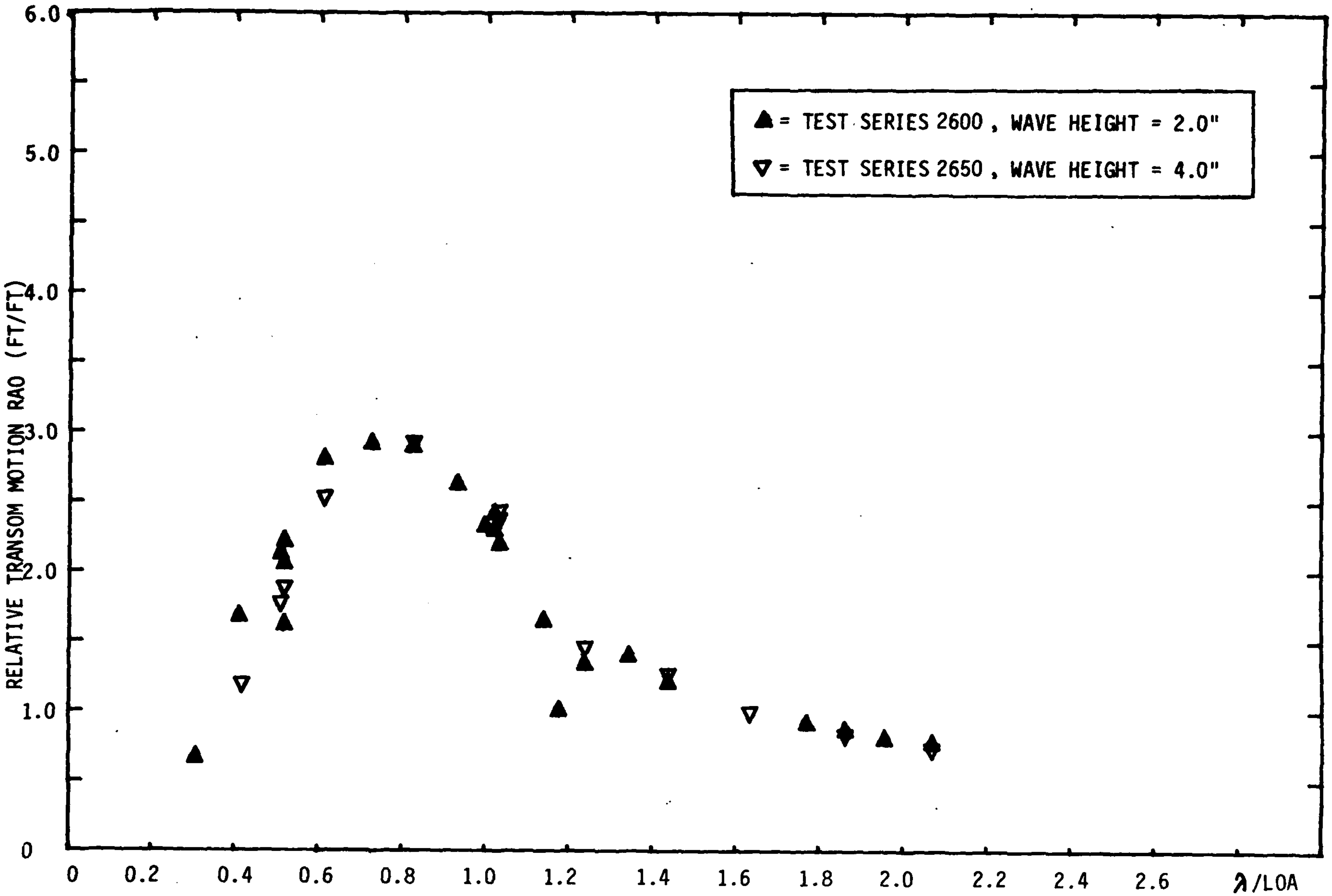

FIGURE 30 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT and 1 MIDSHIP

DORY

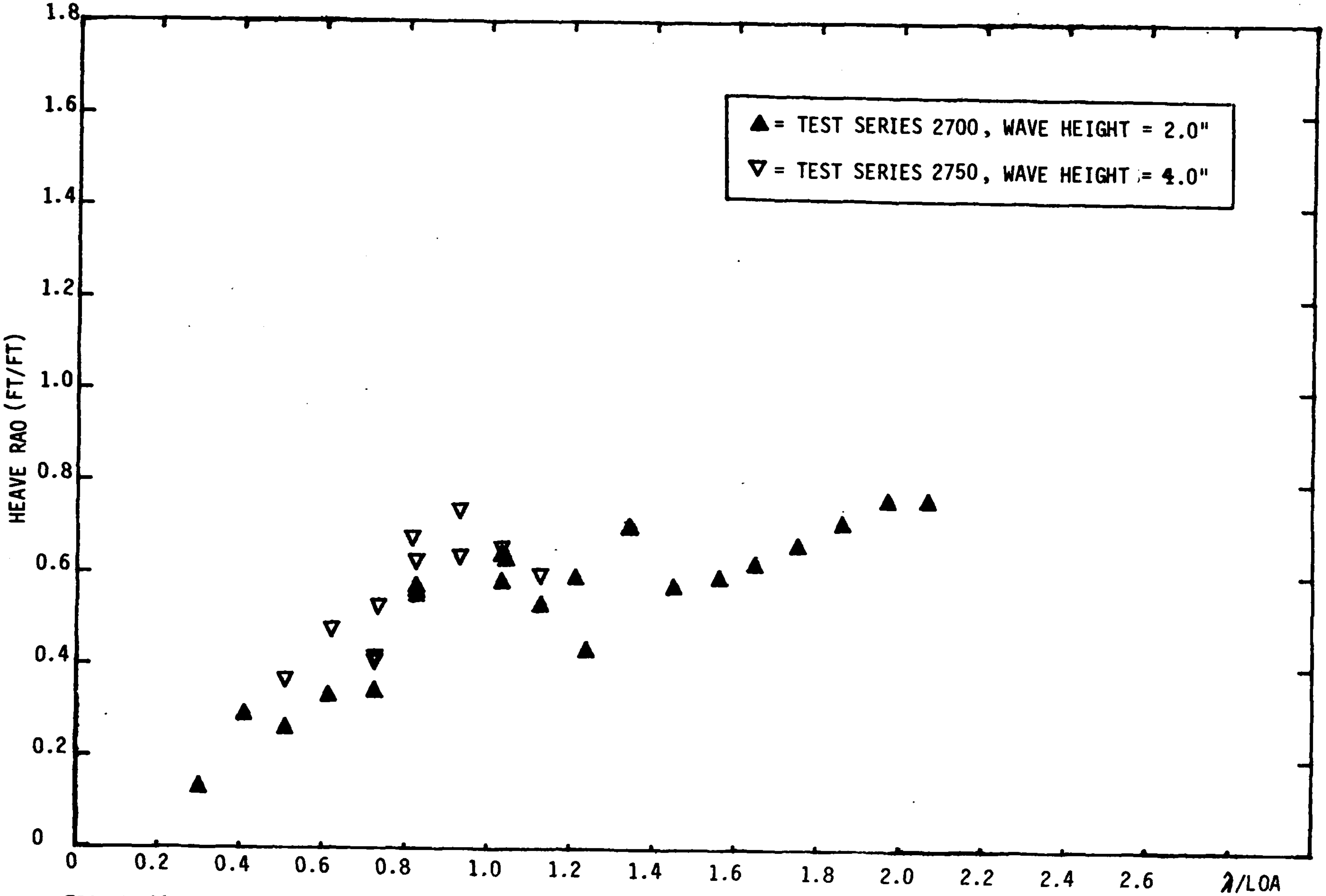

FIGURE 31 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

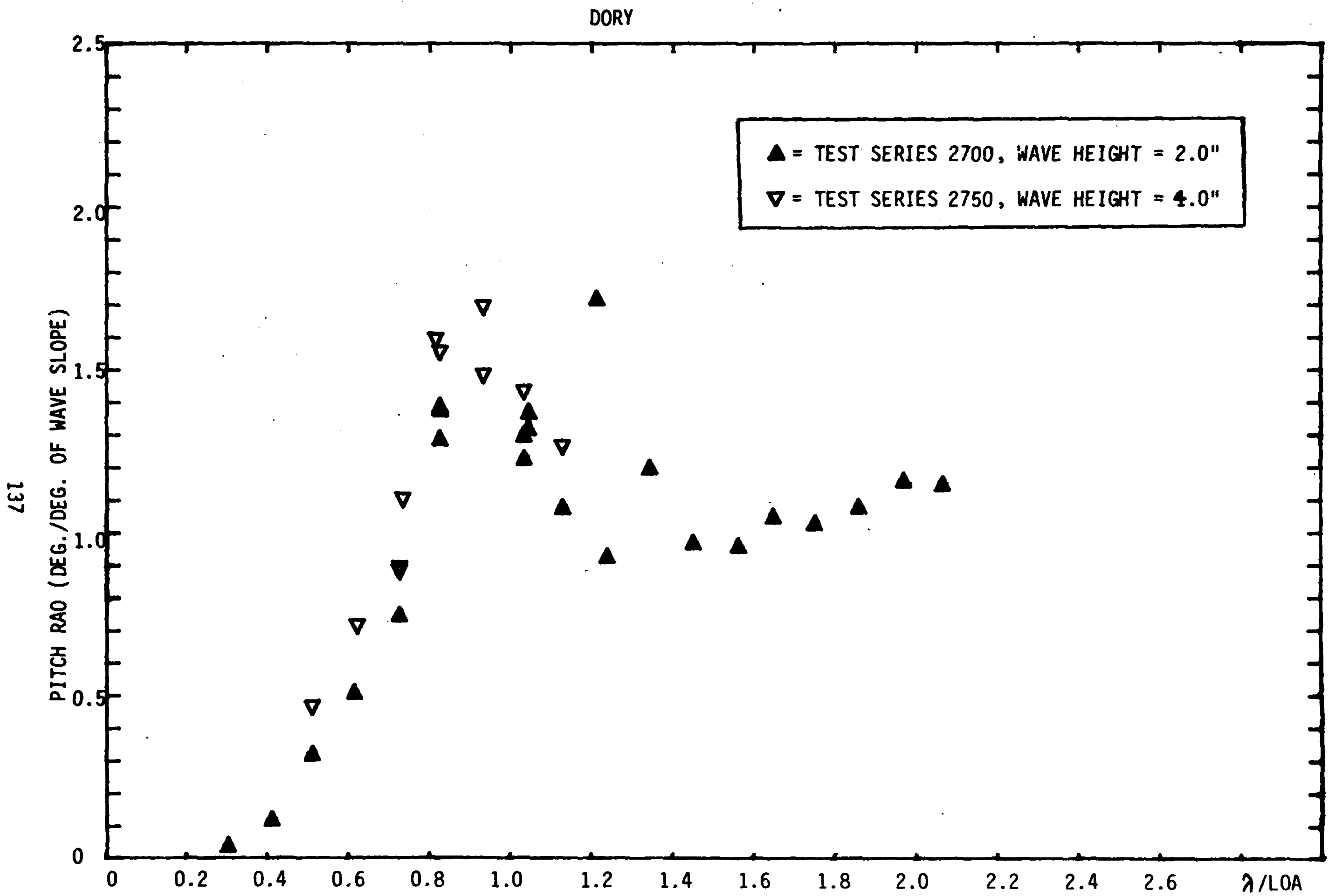

FIGURE 31 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

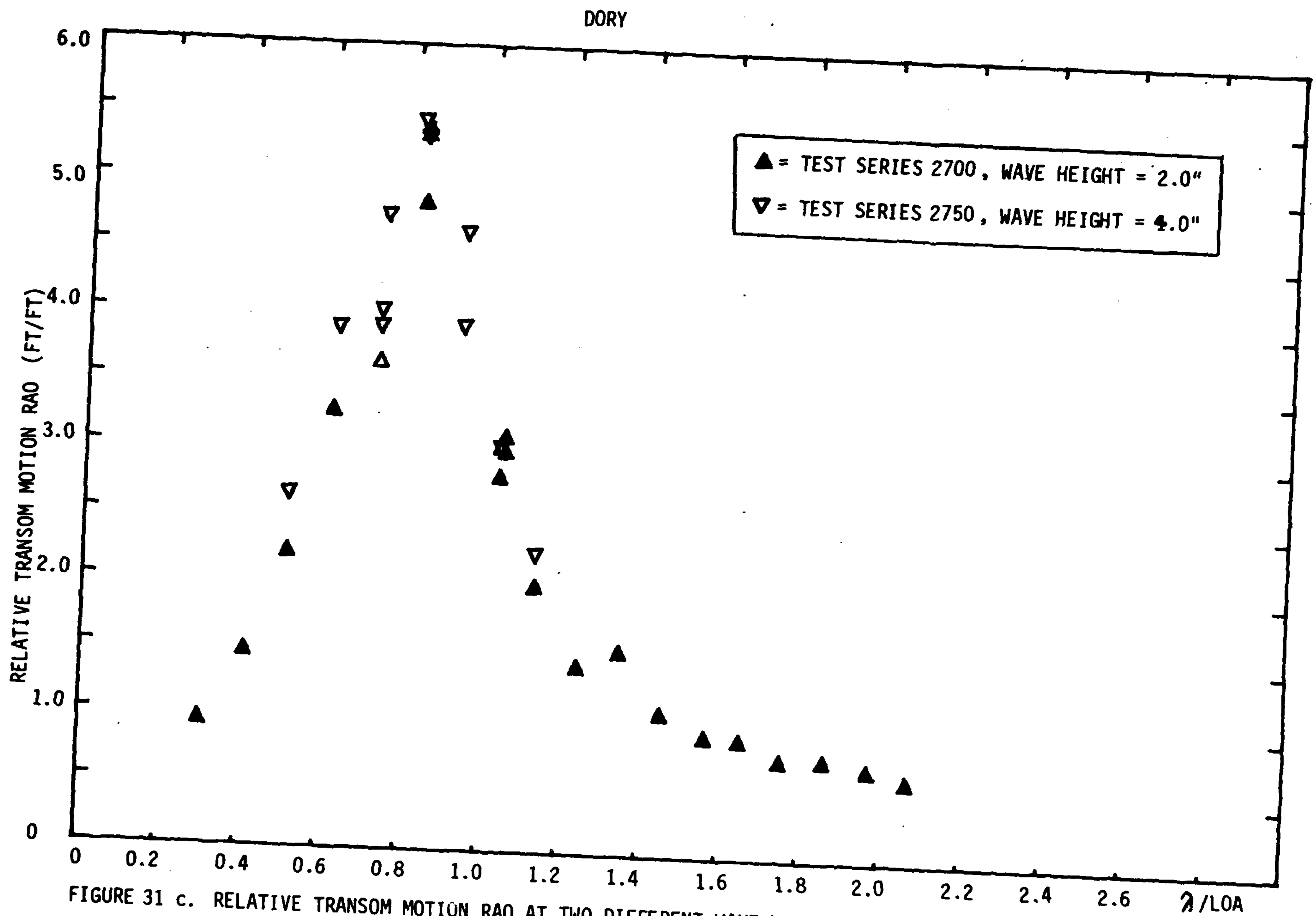

FIGURE 31 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, STERN WAVES, 1 MAN AFT

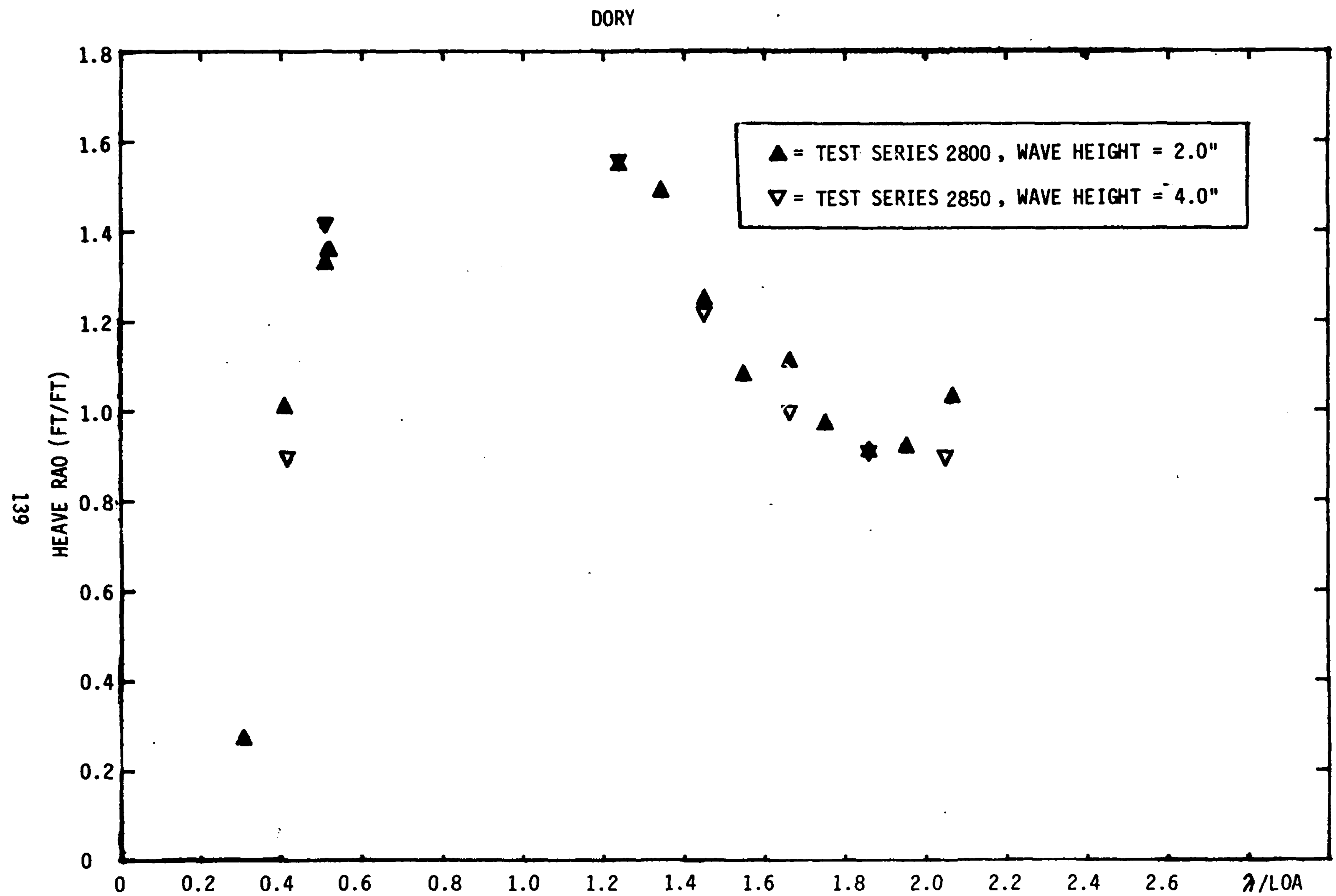

FIGURE 32 a. HEAVE RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 1 MAN FORWARD

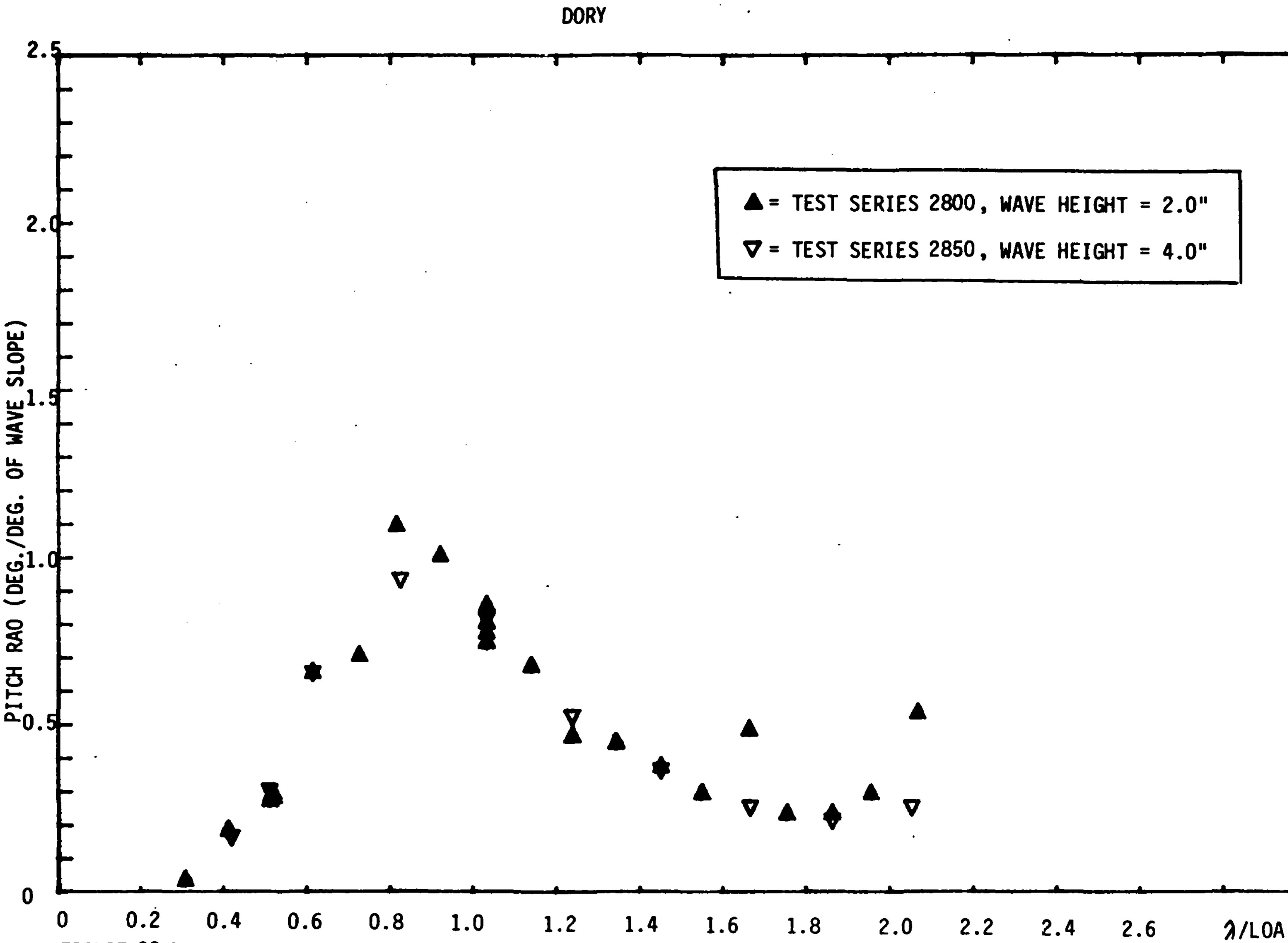

FIGURE 32 b. PITCH RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 1 MAN FORWARD

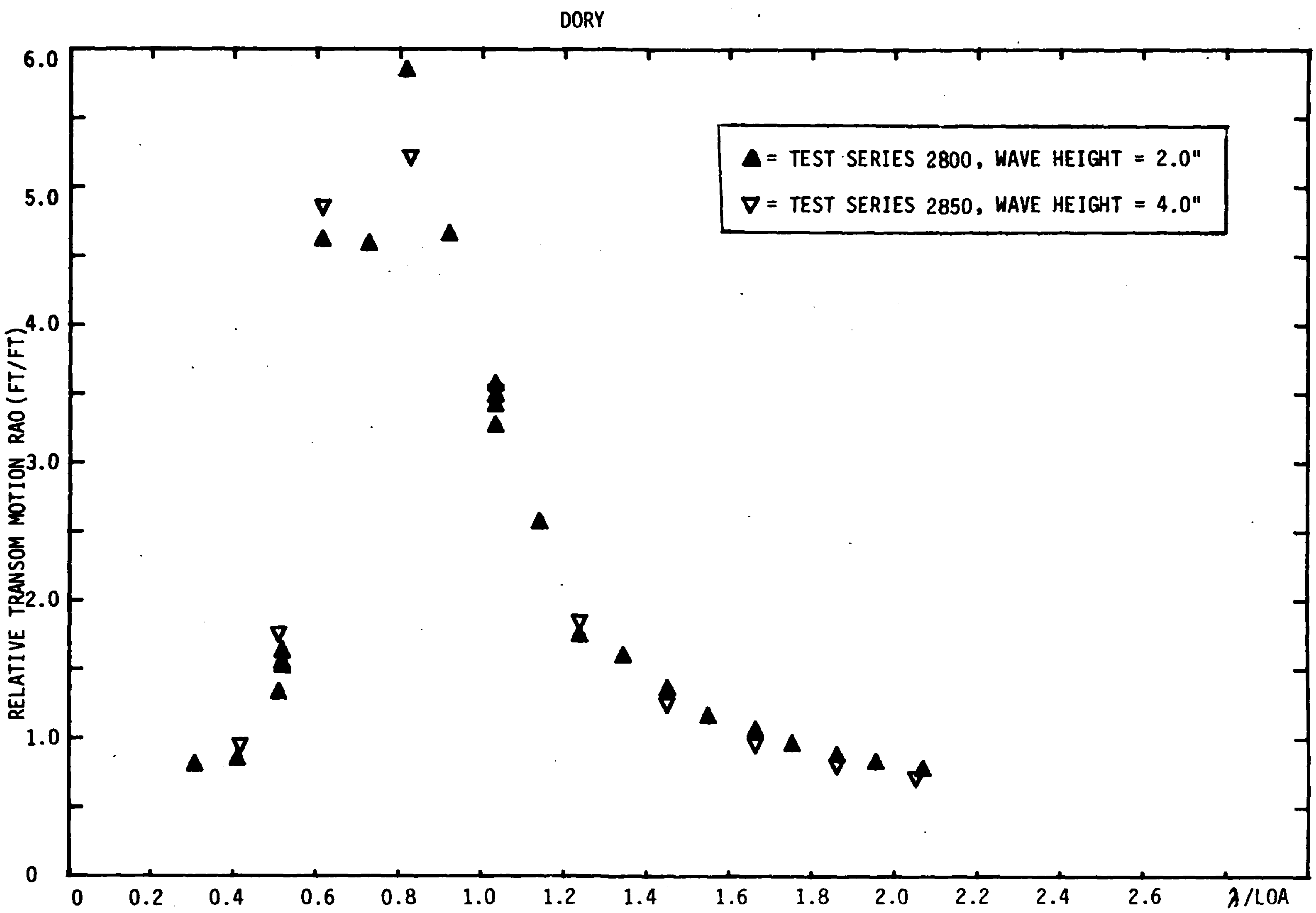

FIGURE 32 c. RELATIVE TRANSOM MOTION RAO AT TWO DIFFERENT WAVE HEIGHTS, BOW WAVES, 1 MAN FORWARD

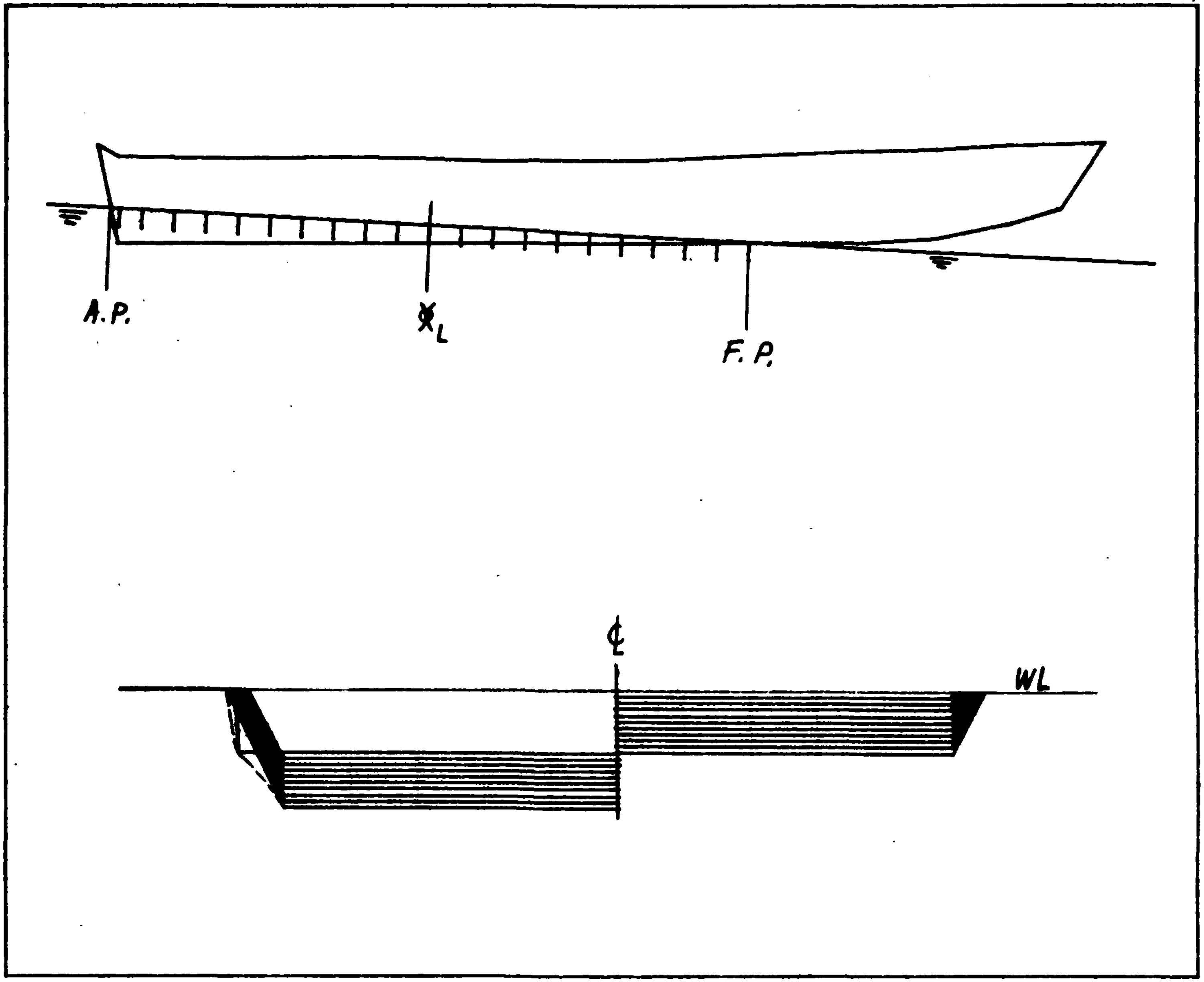

Figure 33a. UNDERBODY SHAPE OF 13.5-FT. JONBOAT IN TEST SERIES 100 (AS "SEEN" BY HANSEL)

13.5 FT. JOHNBOAT

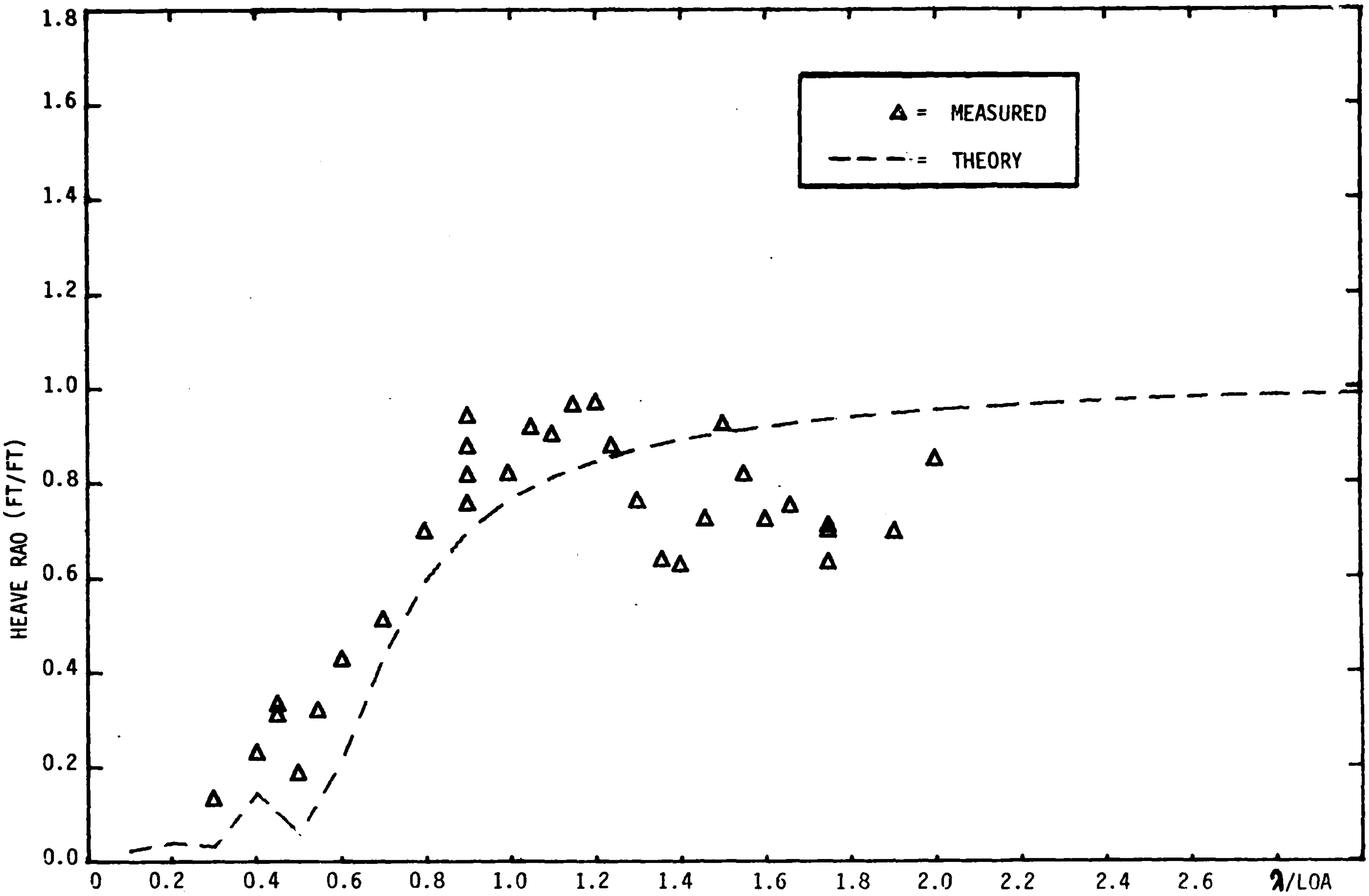

Figure 33 b. HEAVE RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 100

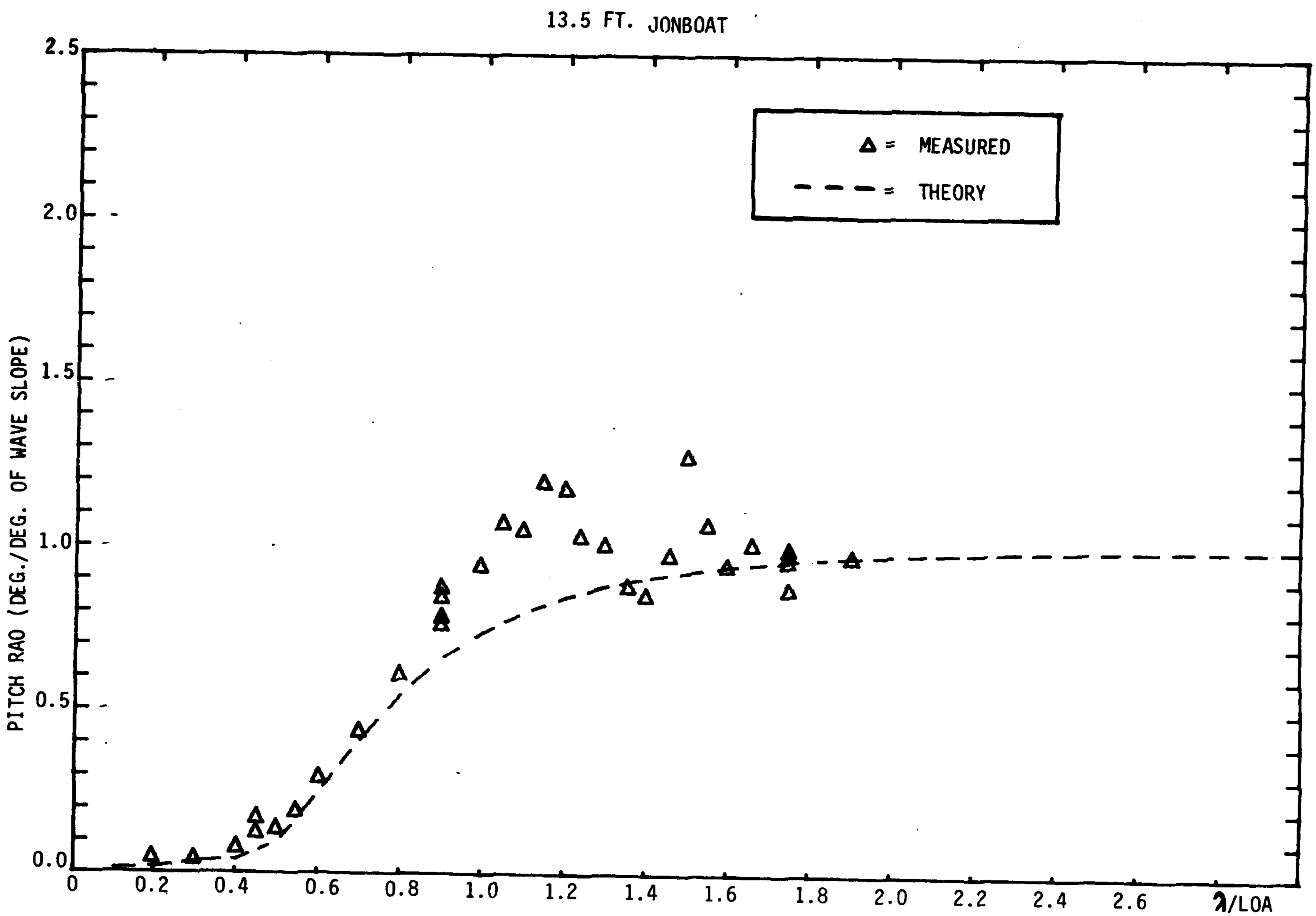

Figure 33 c. PITCH RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 100

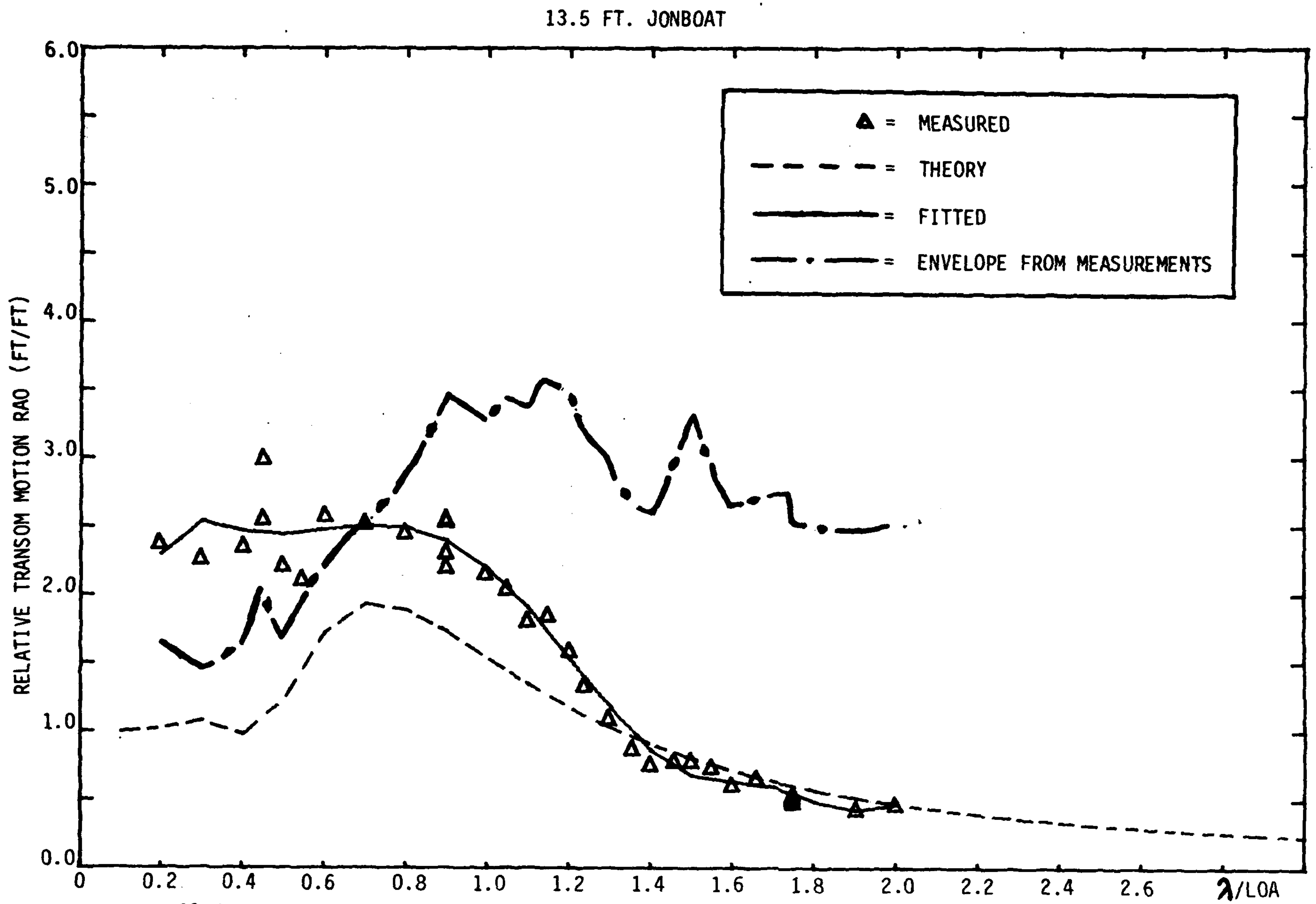

Figure 33 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 100

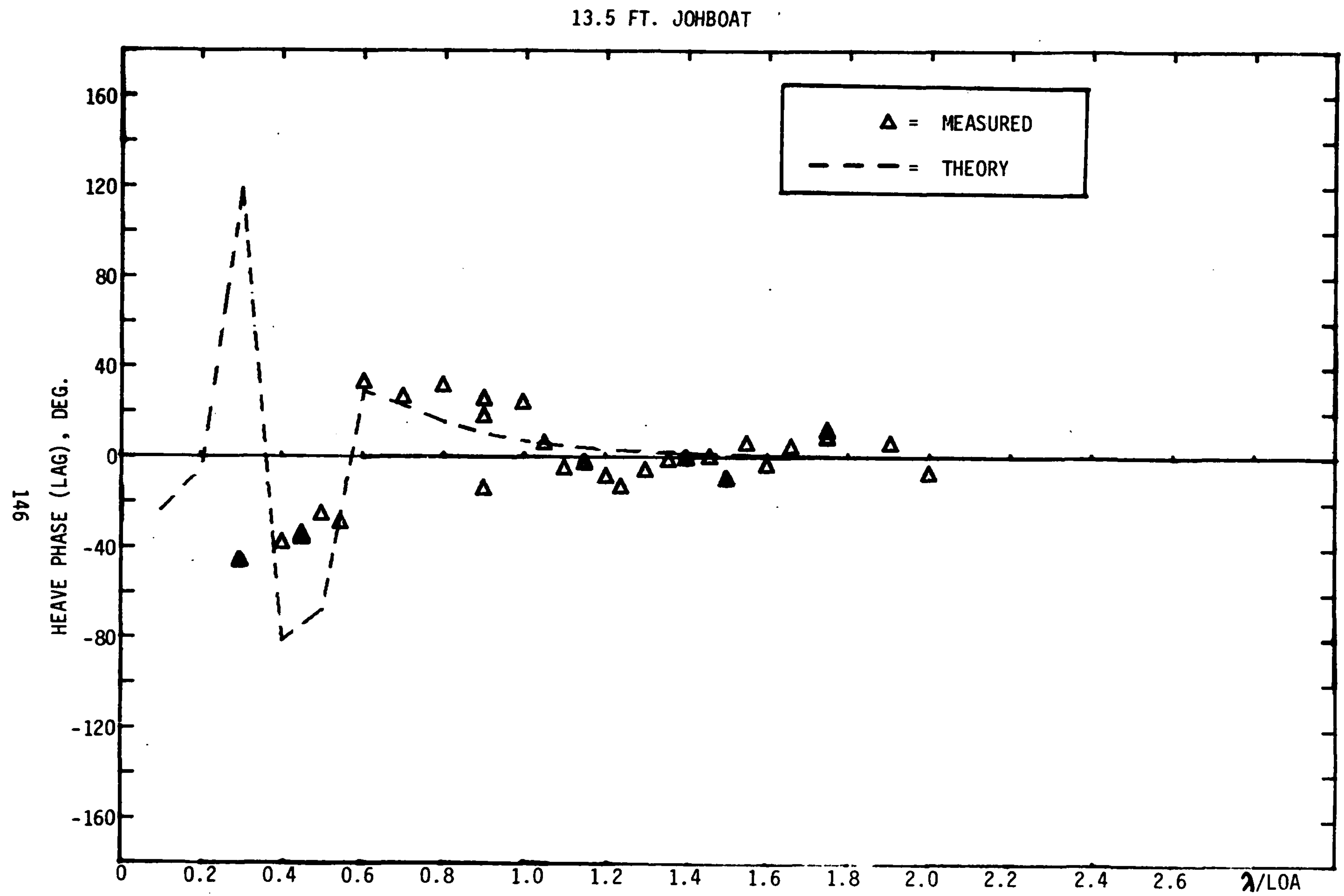

Figure 33 e. HEAVE PHASE, STERN WAVES, 1 MAN AFT, TEST SERIES 100

13.5 FT. JONBOAT

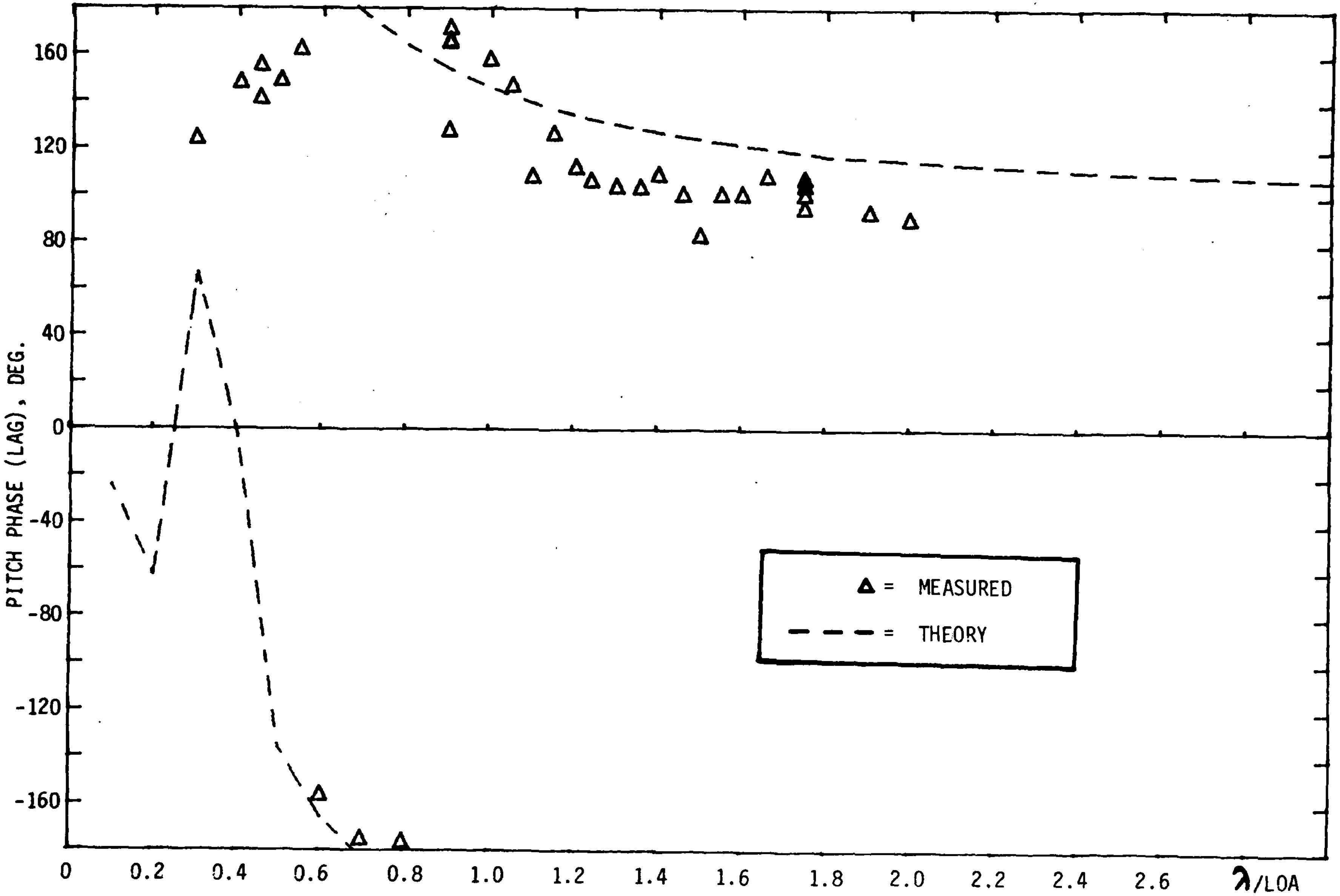

Figure 33 f. PITCH PHASE, STERN WAVES, 1 MAN AFT, TEST SERIES 100

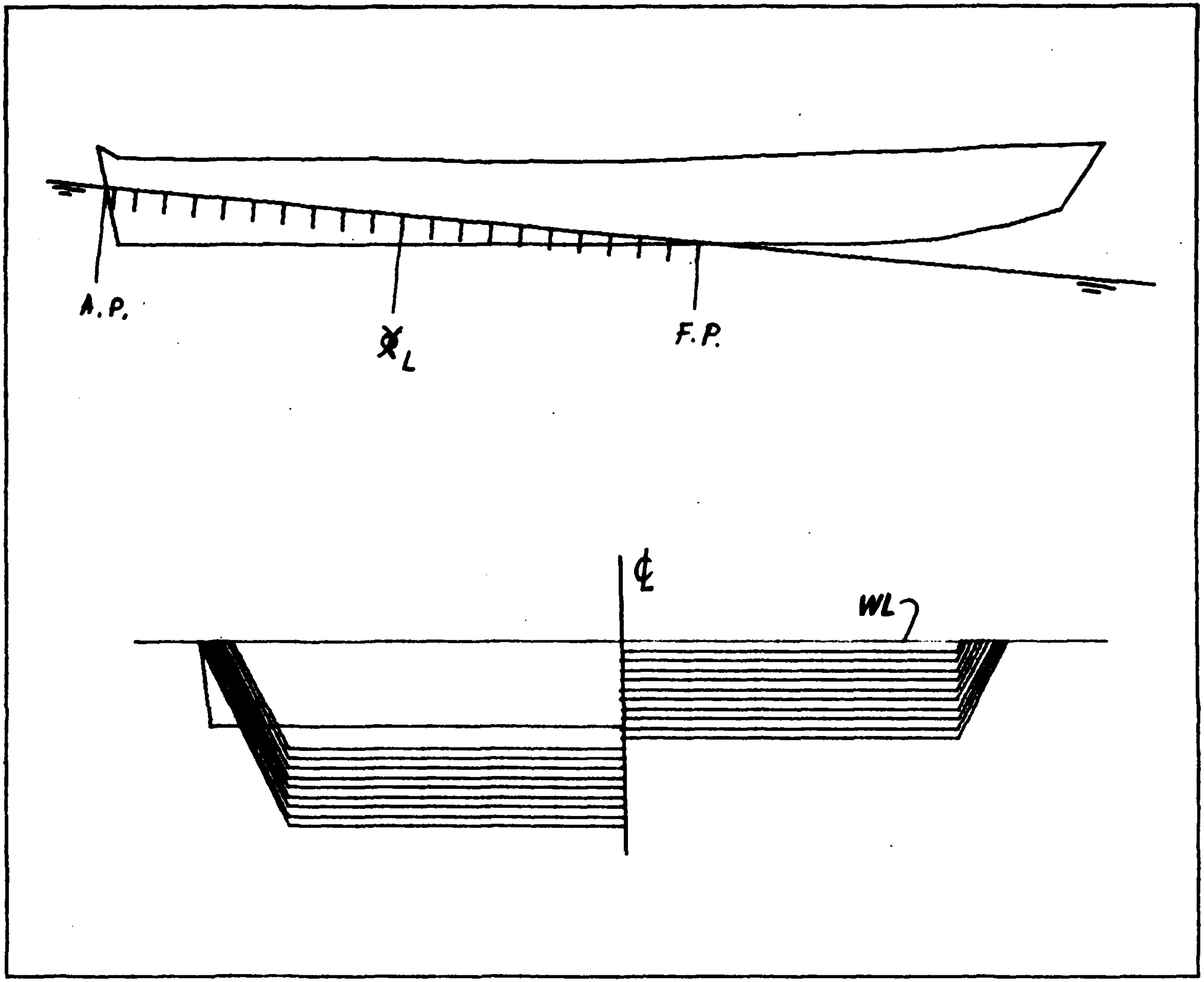

Figure 34a. UNDERBODY SHAPE OF 13.5-FT. JONBOAT IN TEST SERIES 300 (AS "SEEN" BY HANSEL)

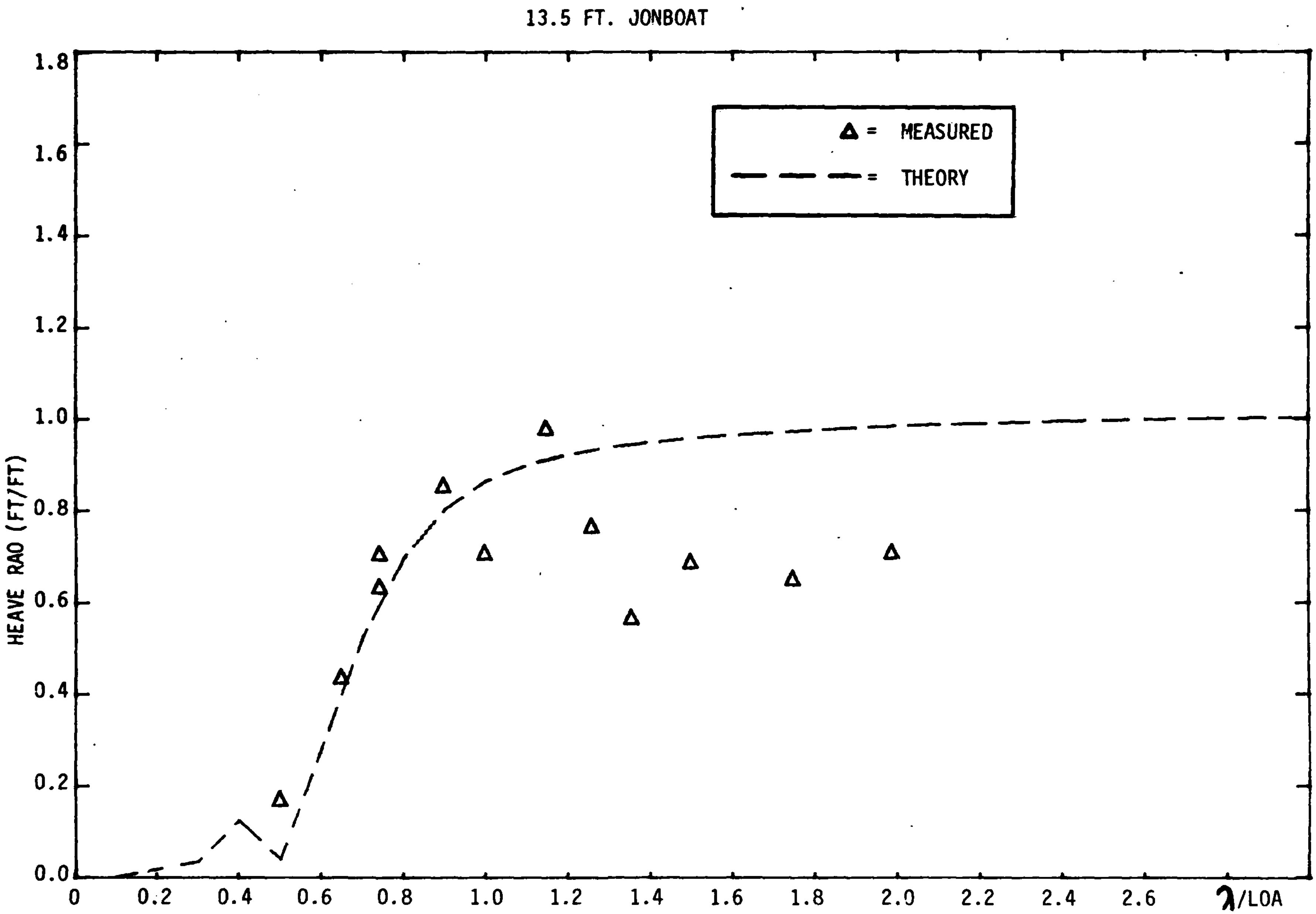

Figure 34 b. HEAVE RAO, STERN WAVES, 2 MEN AFT, TEST SERIES 300

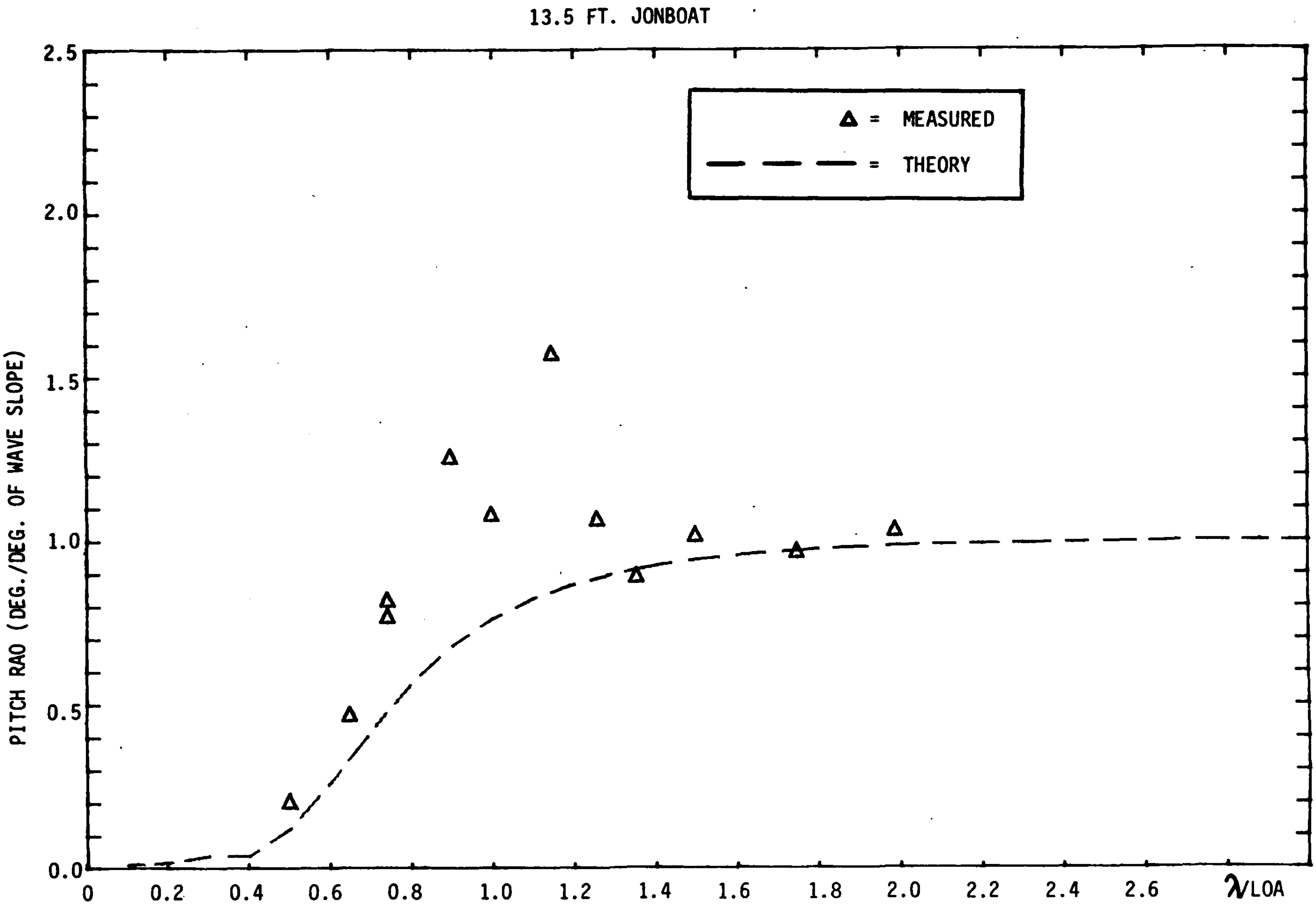

Figure 34 c. PITCH RAO, STERN WAVES, 2 MEN AFT, TEST SERIES 300

13.5 FT. JONBOAT

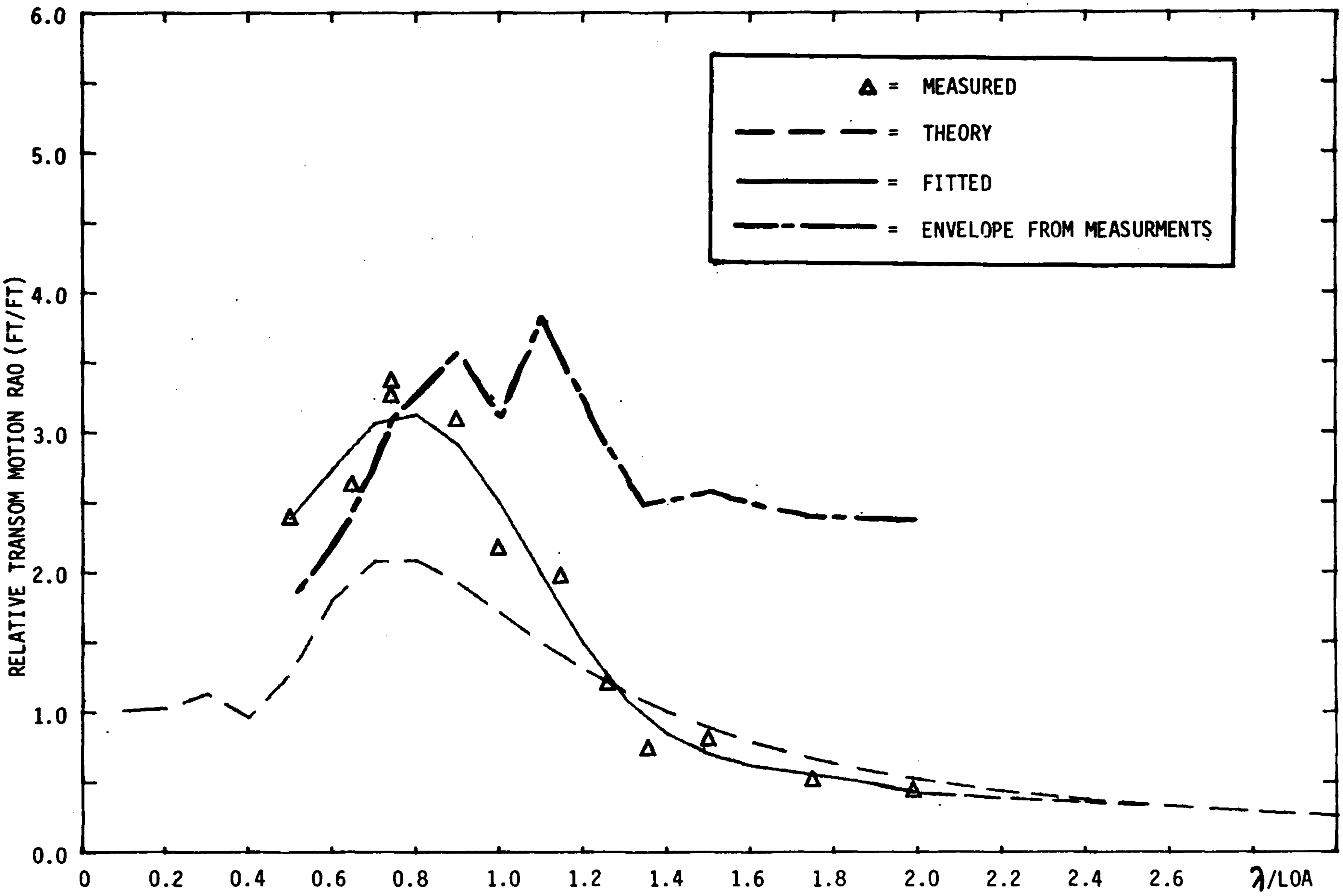

Figure 34 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 2 MEN AFT, TEST SERIES 300

13.5 FT. JONBOAT

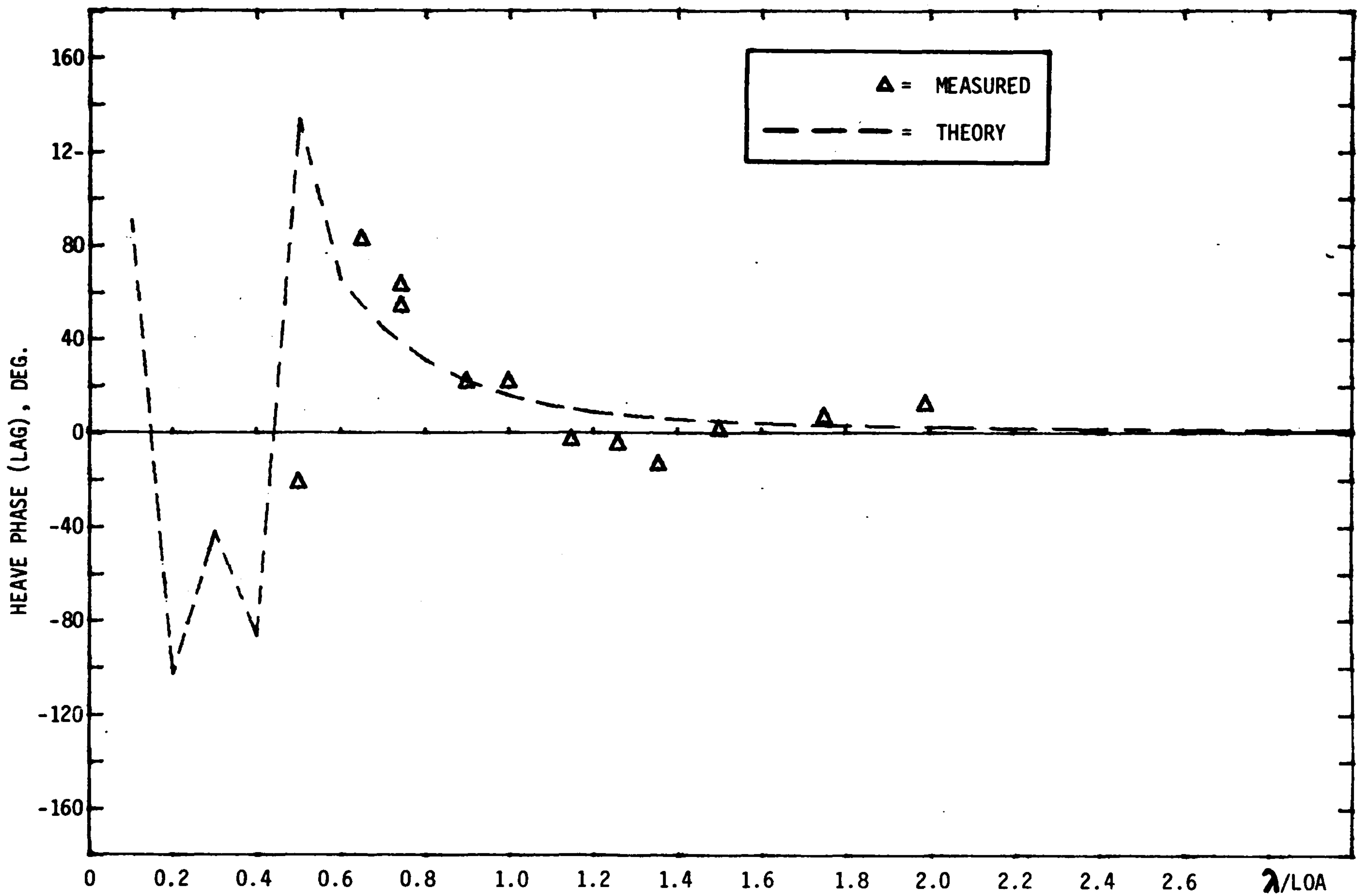

Figure 34 e. HEAVE PHASE, STERN WAVES, 2 MEN AFT, TEST SERIES 300

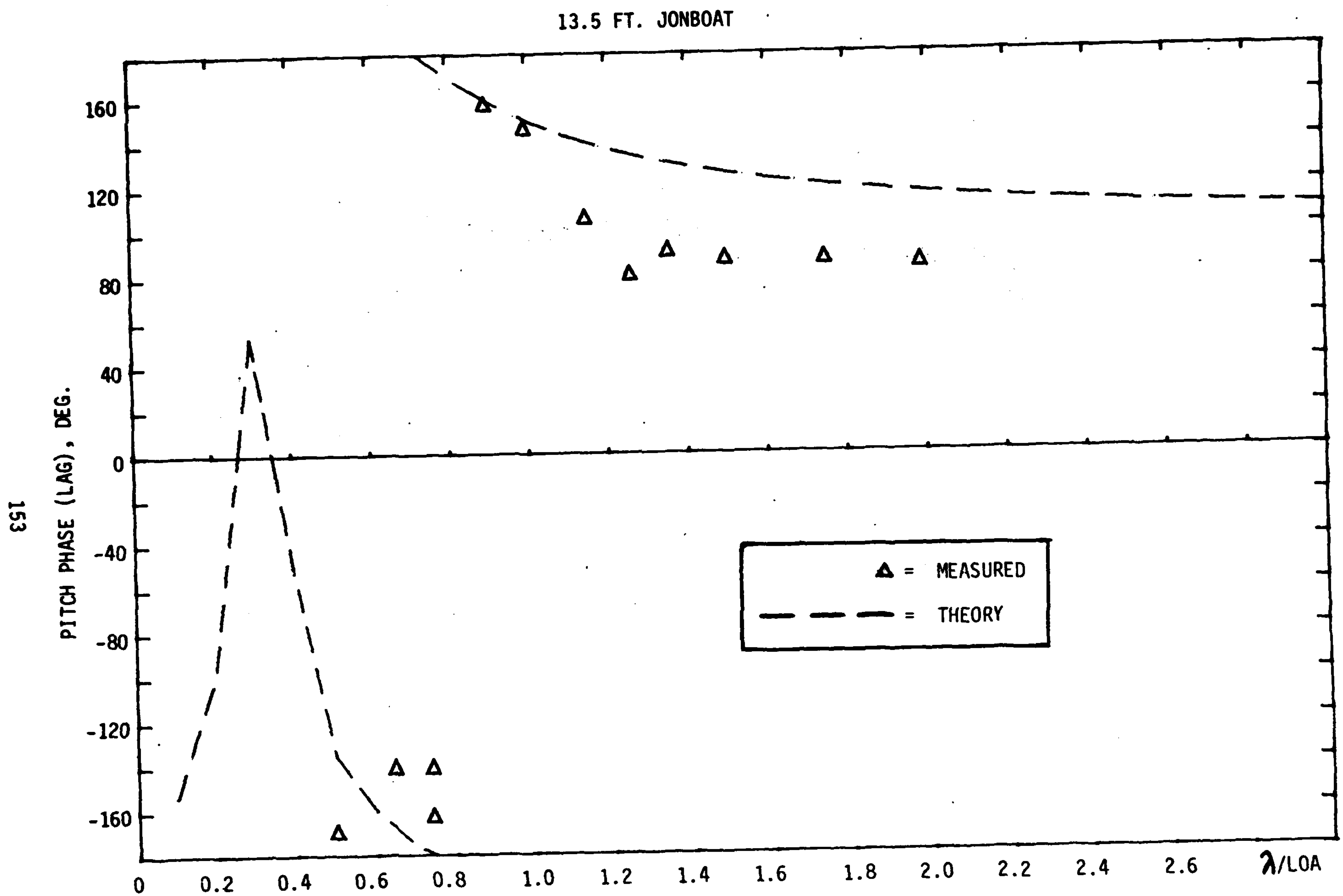

Figure 34 f. PITCH PHASE, STERN WAVES, 2 MEN AFT, TEST SERIES 300

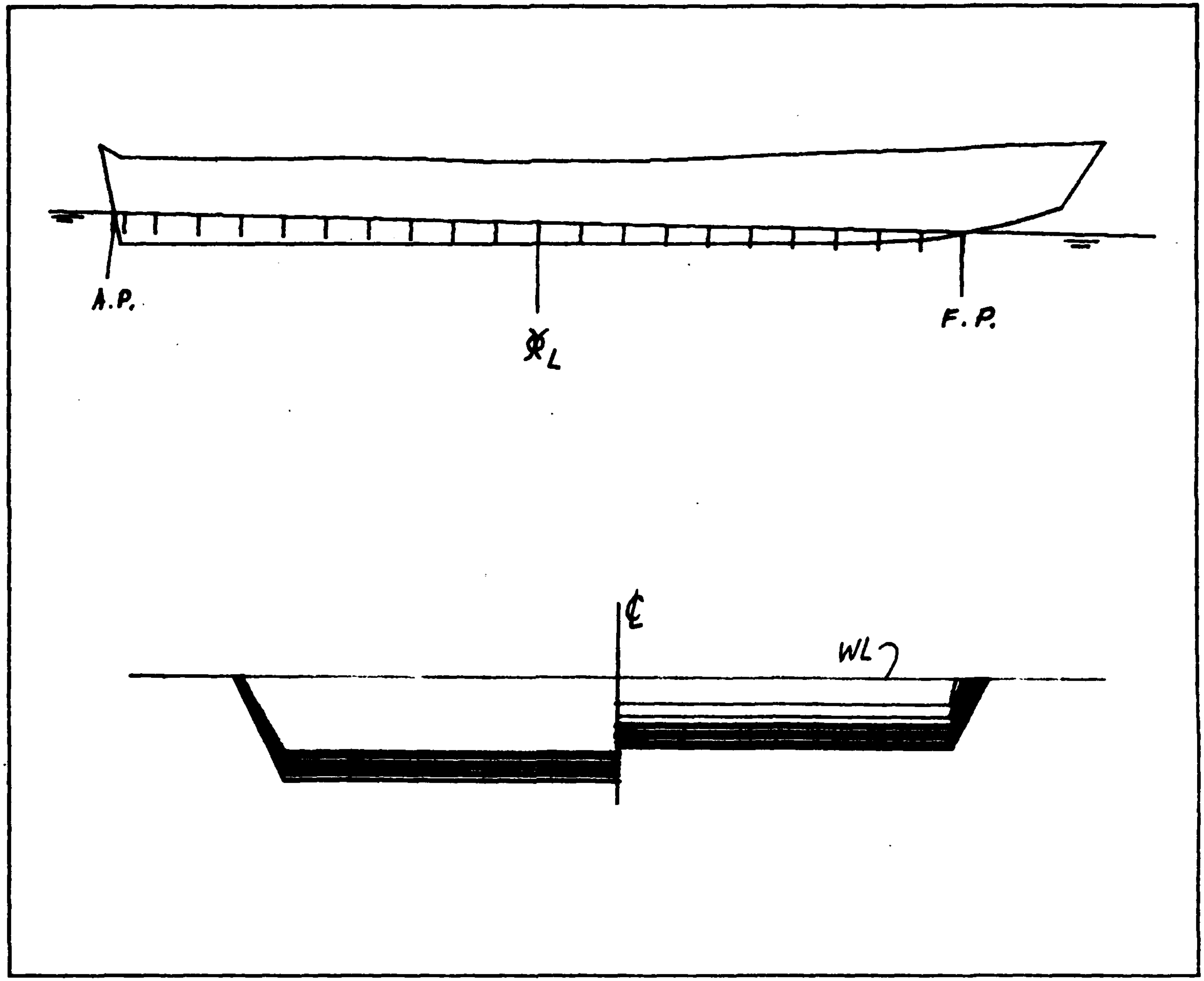

Figure 35a. UNDERBODY SHAPE OF 13.5-FT. JONBOAT IN TEST SERIES 500 (AS "SEEN" BY HANSEL)

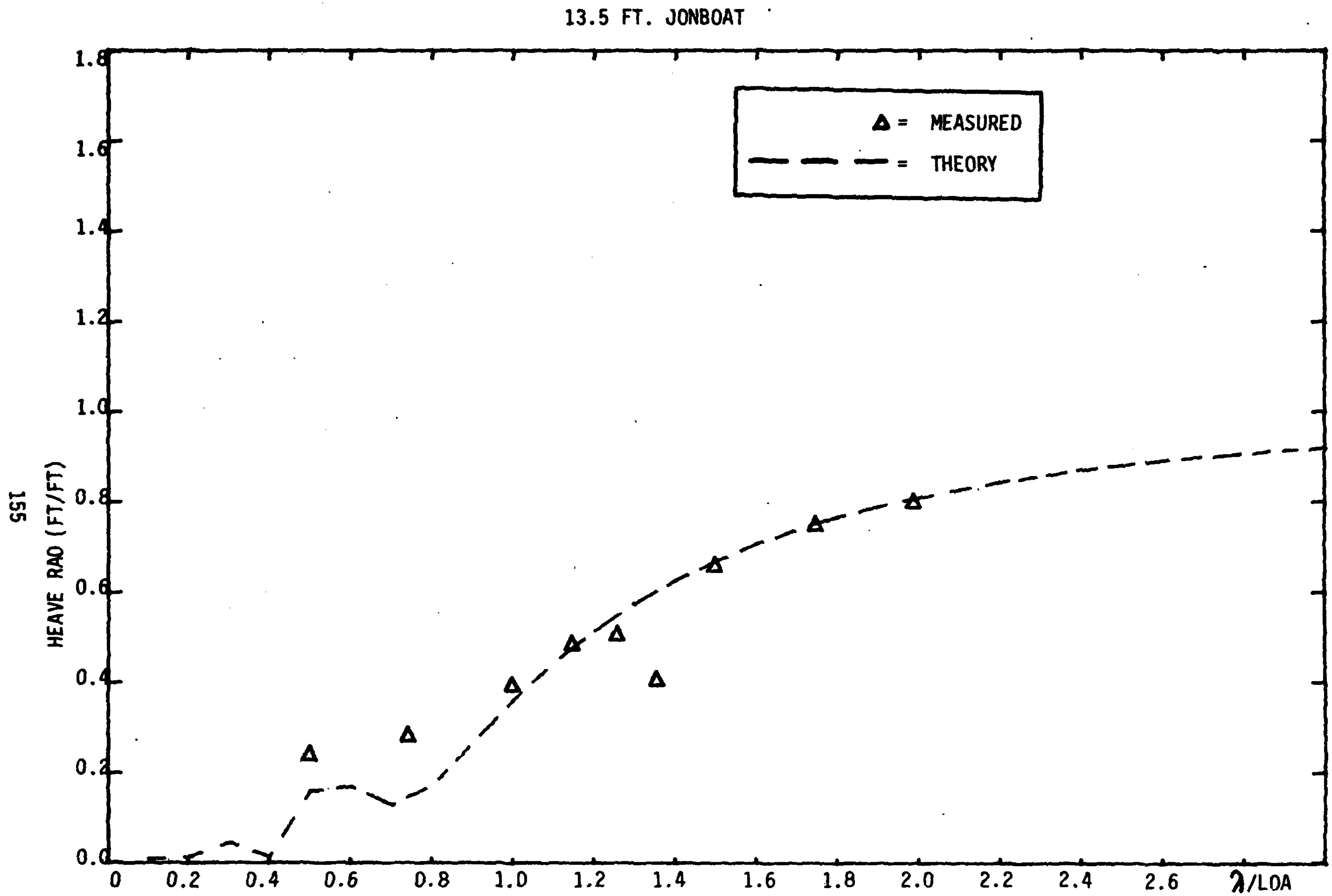

Figure 35 b. HEAVE RAO, STERN WAVES, 1 MAN AFT, 1 MAN MIDSHIP, TEST SERIES 500

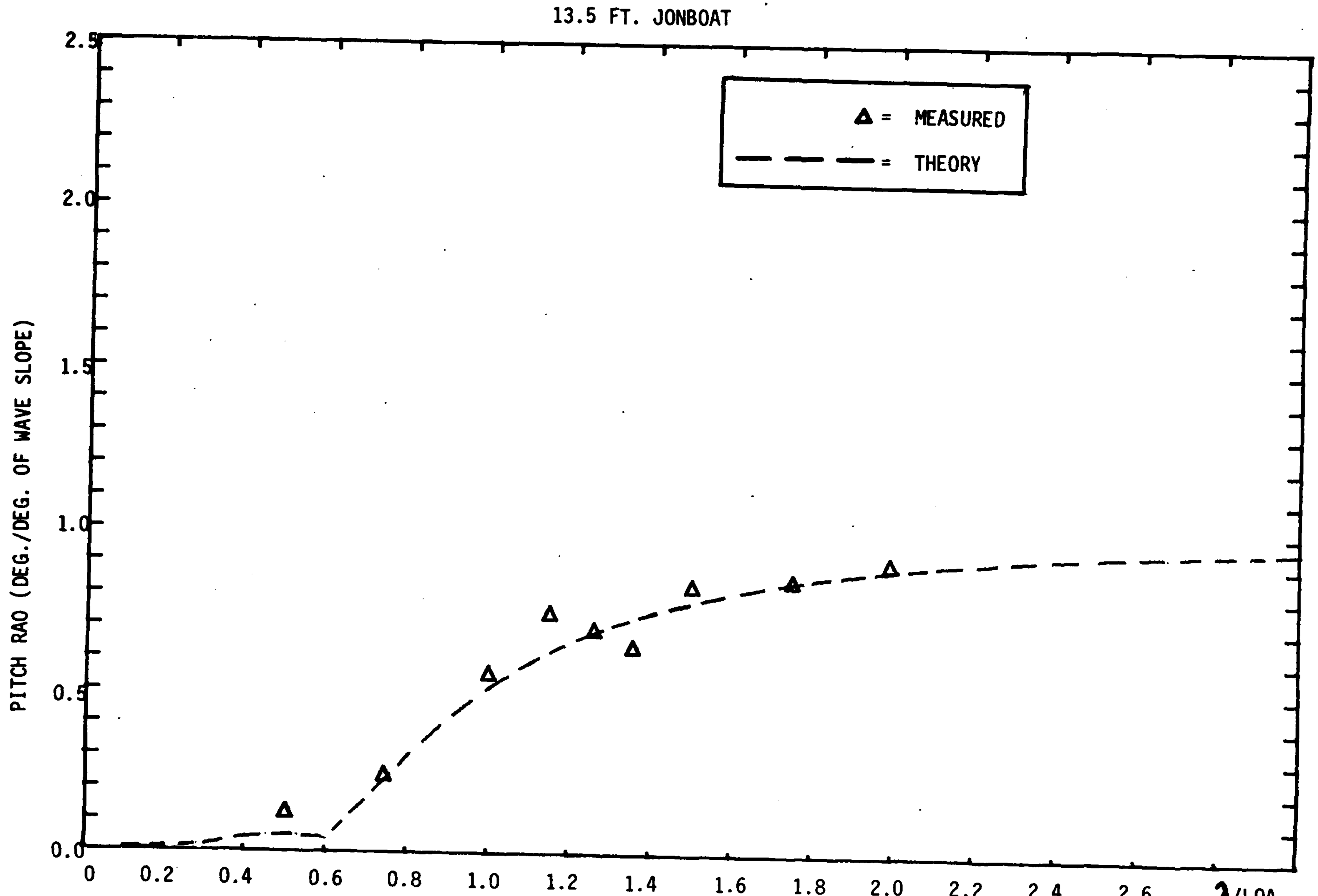

Figure 35 c. PITCH RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 500

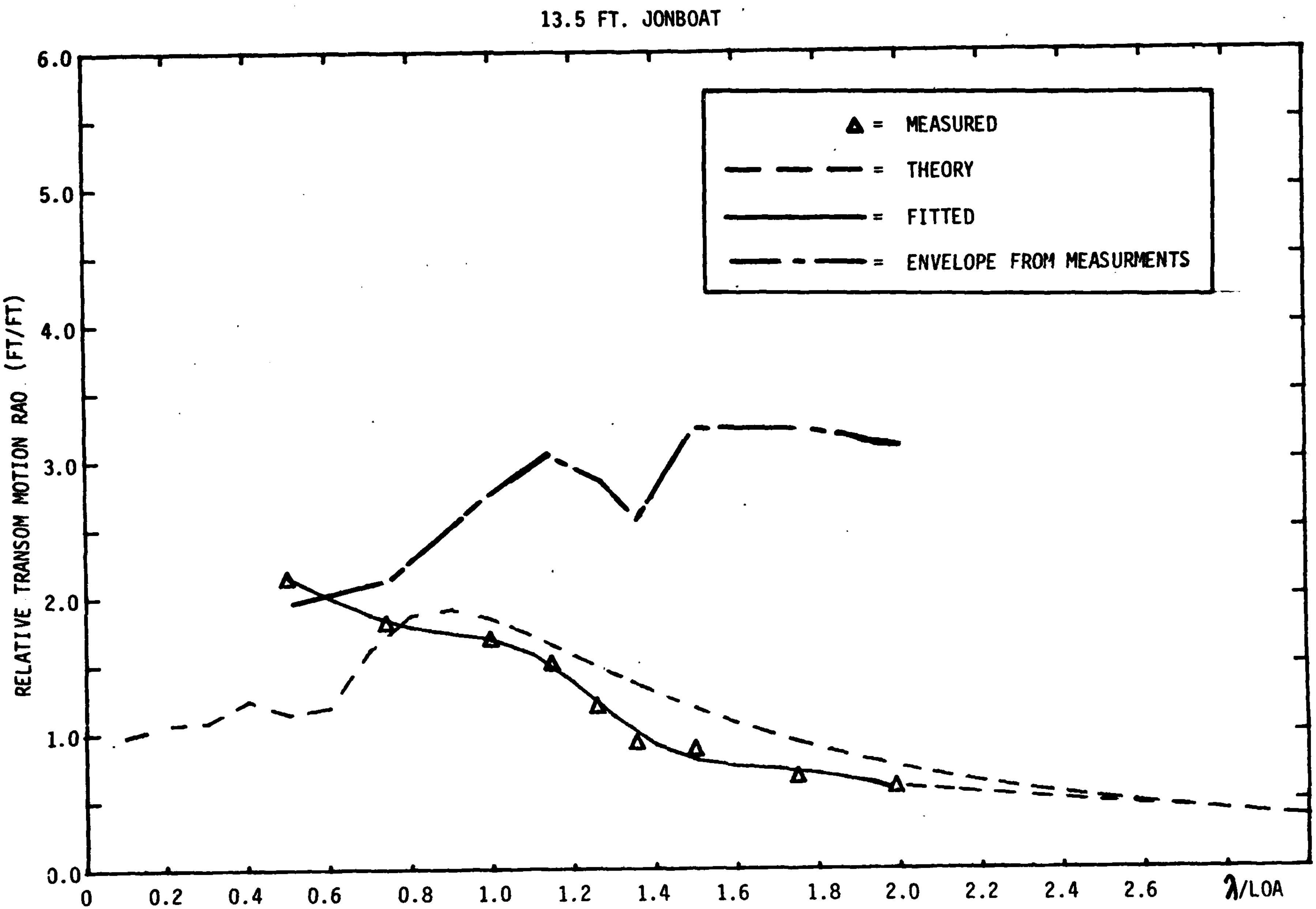

Figure 35 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 500

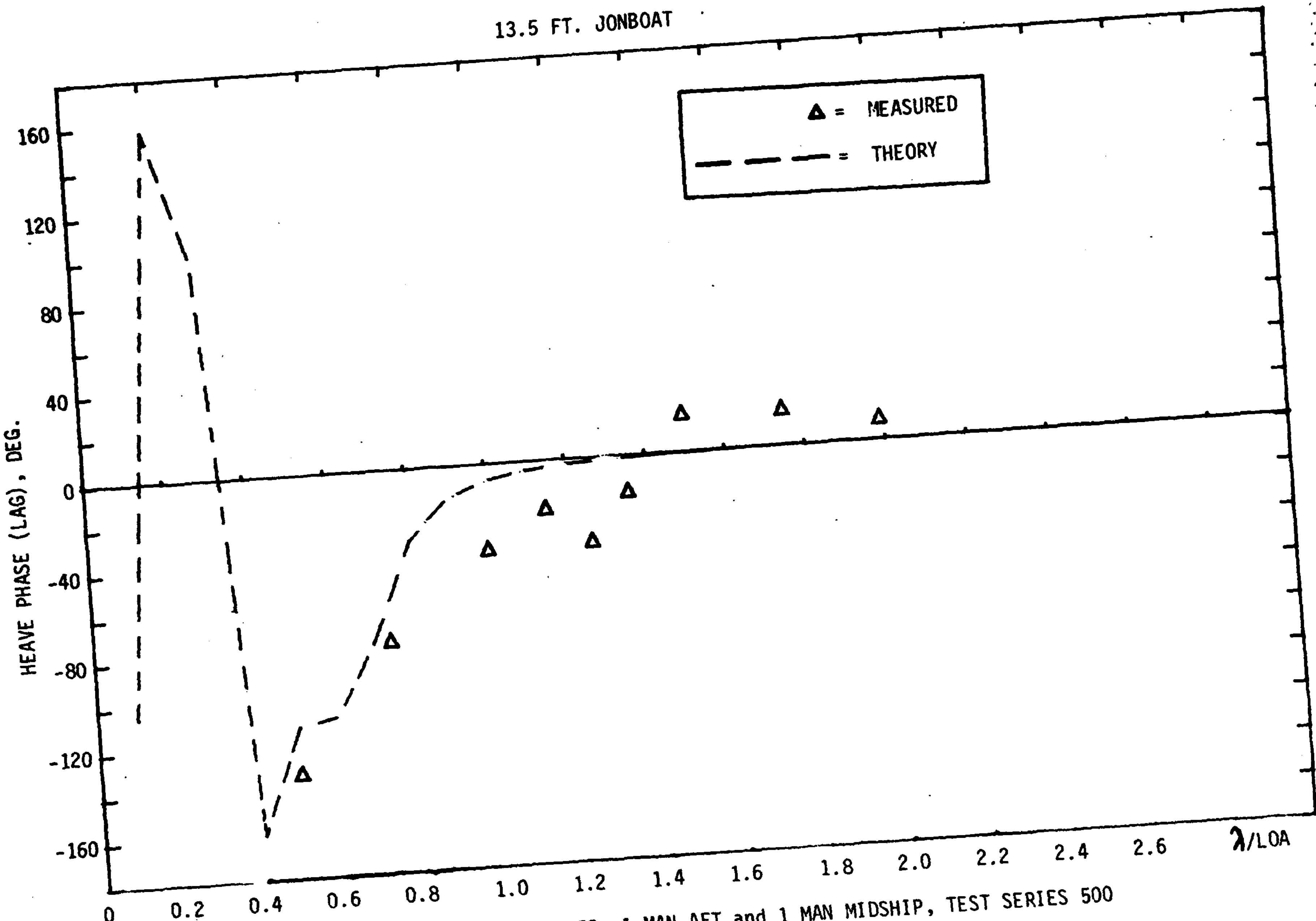

Figure 35 e. HEAVE PHASE, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 500

13.5 FT. JONBOAT

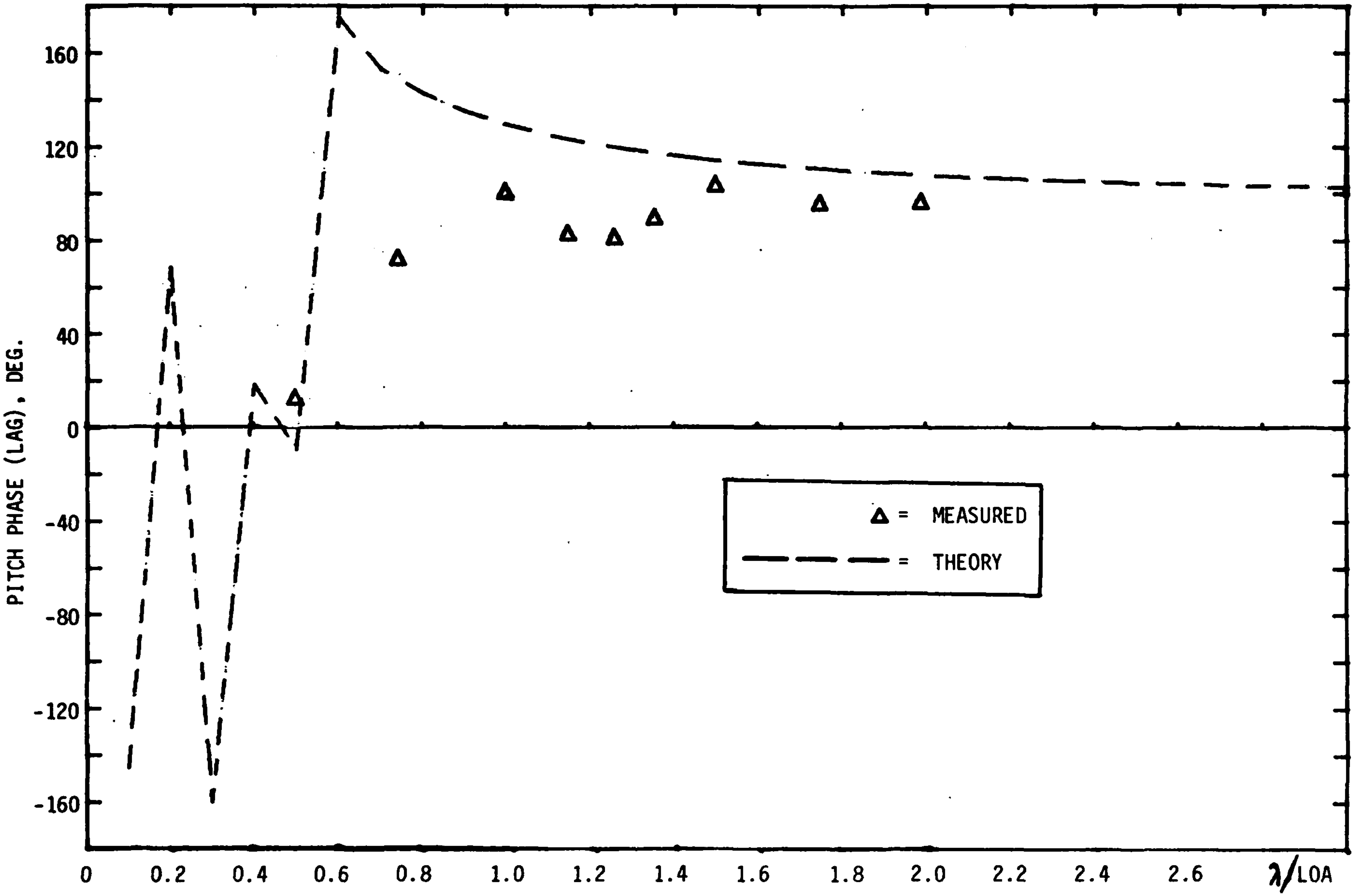

Figure 35 f. PITCH PHASE, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 500

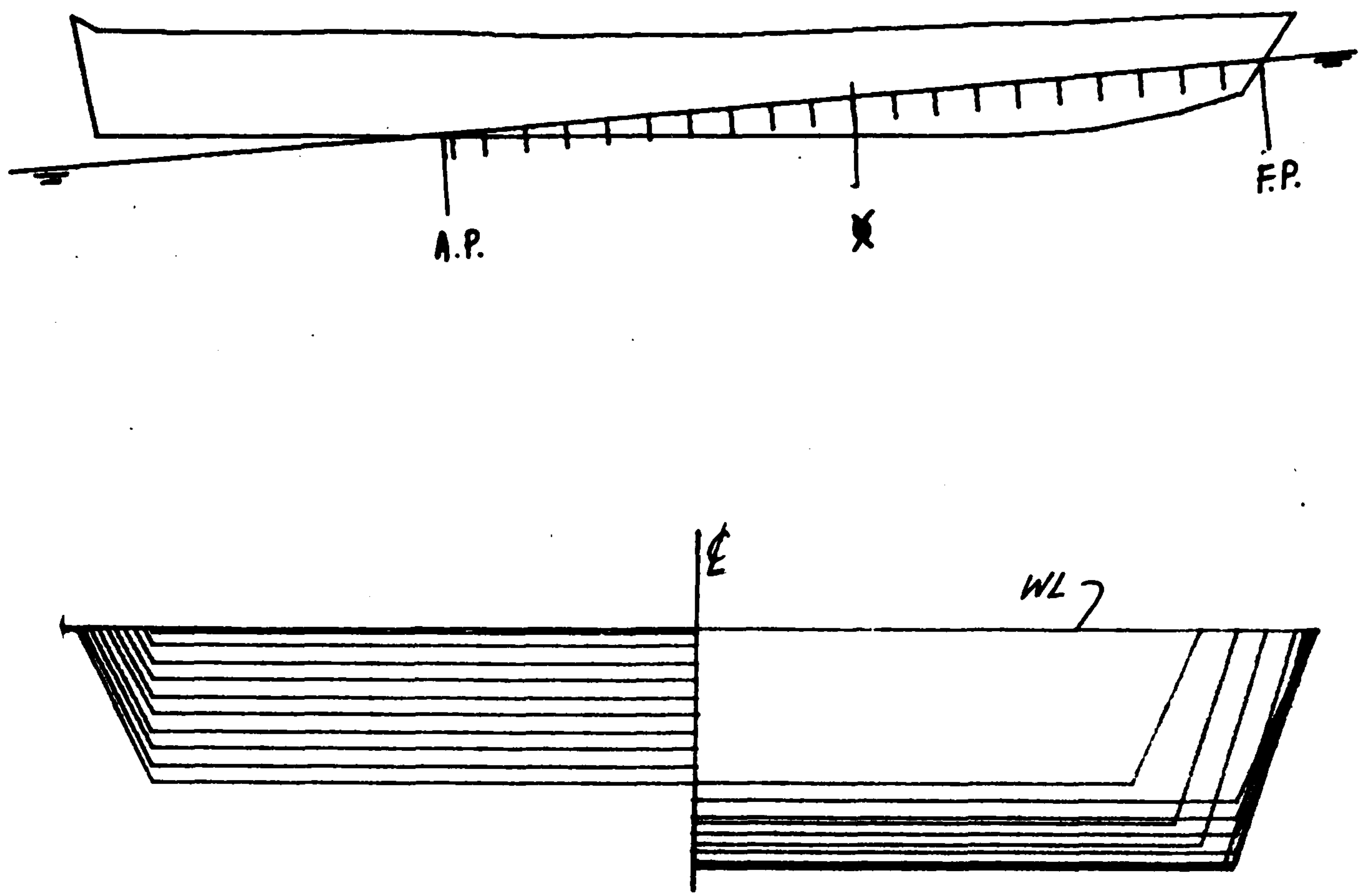

Figure 36a. UNDERBODY SHAPE OF 13.5-FT. JONBOAT IN TEST SERIES 700 (AS "SEEN" BY HANSEL)

13.5 FT. JONBOAT

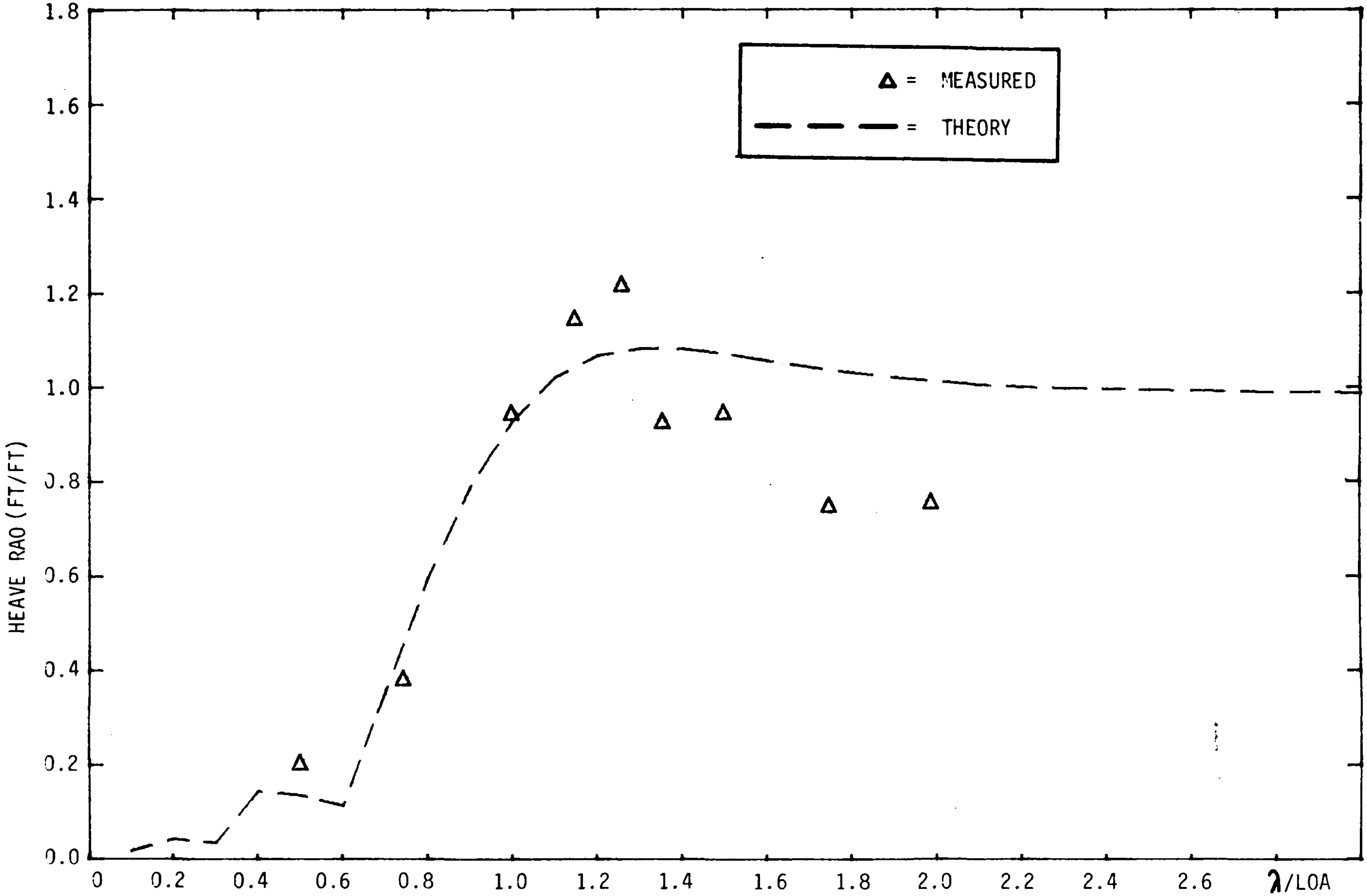

Figure 36 b. HEAVE RAO, HEAD WAVES, 2 MEN FORWARD, TEST SERIES 700

13.5 FT. JONBOAT

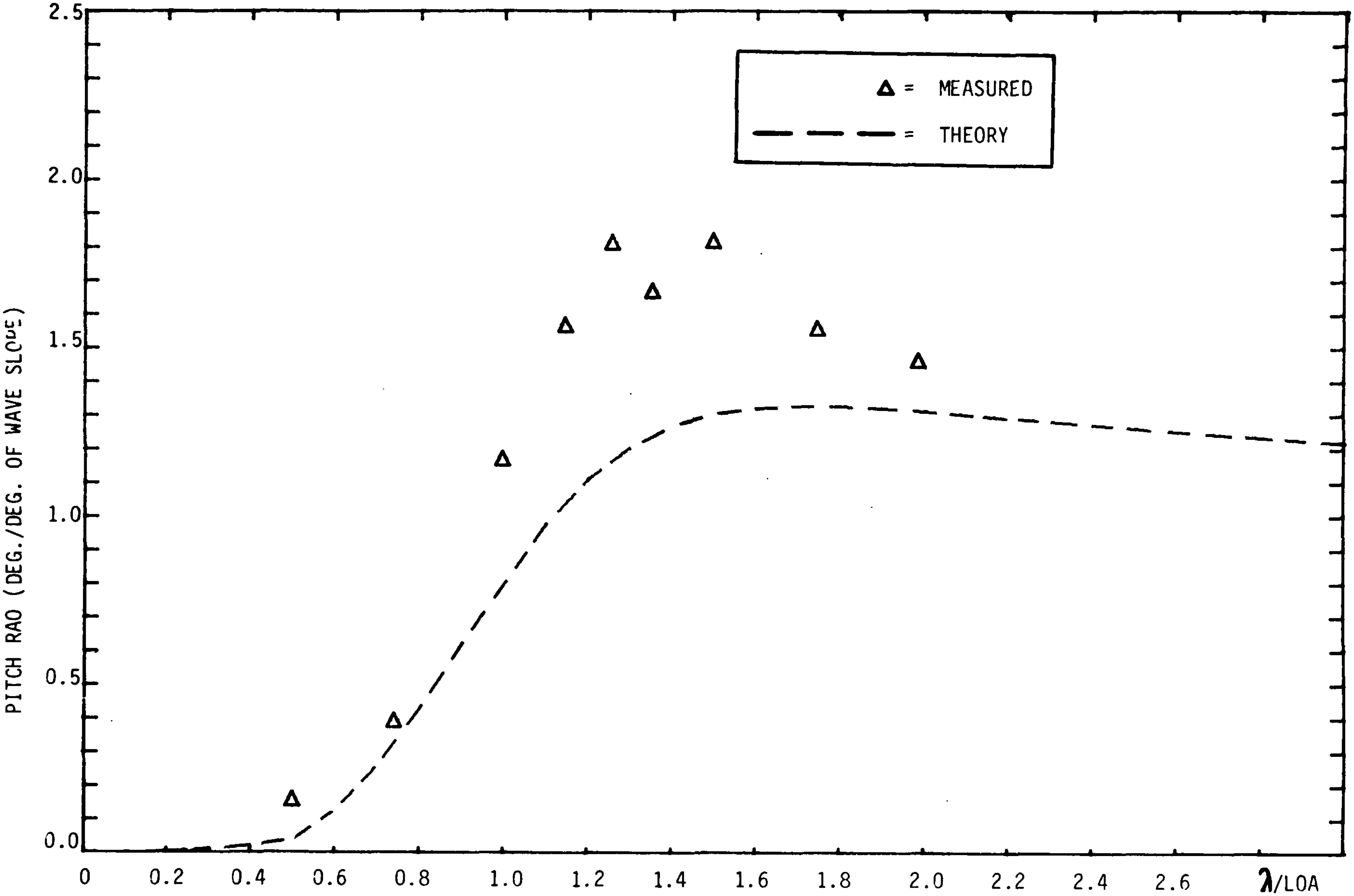

Figure 36 c. PITCH RAO, HEAD WAVES, 2 MEN FORWARD, TEST SERIES 700

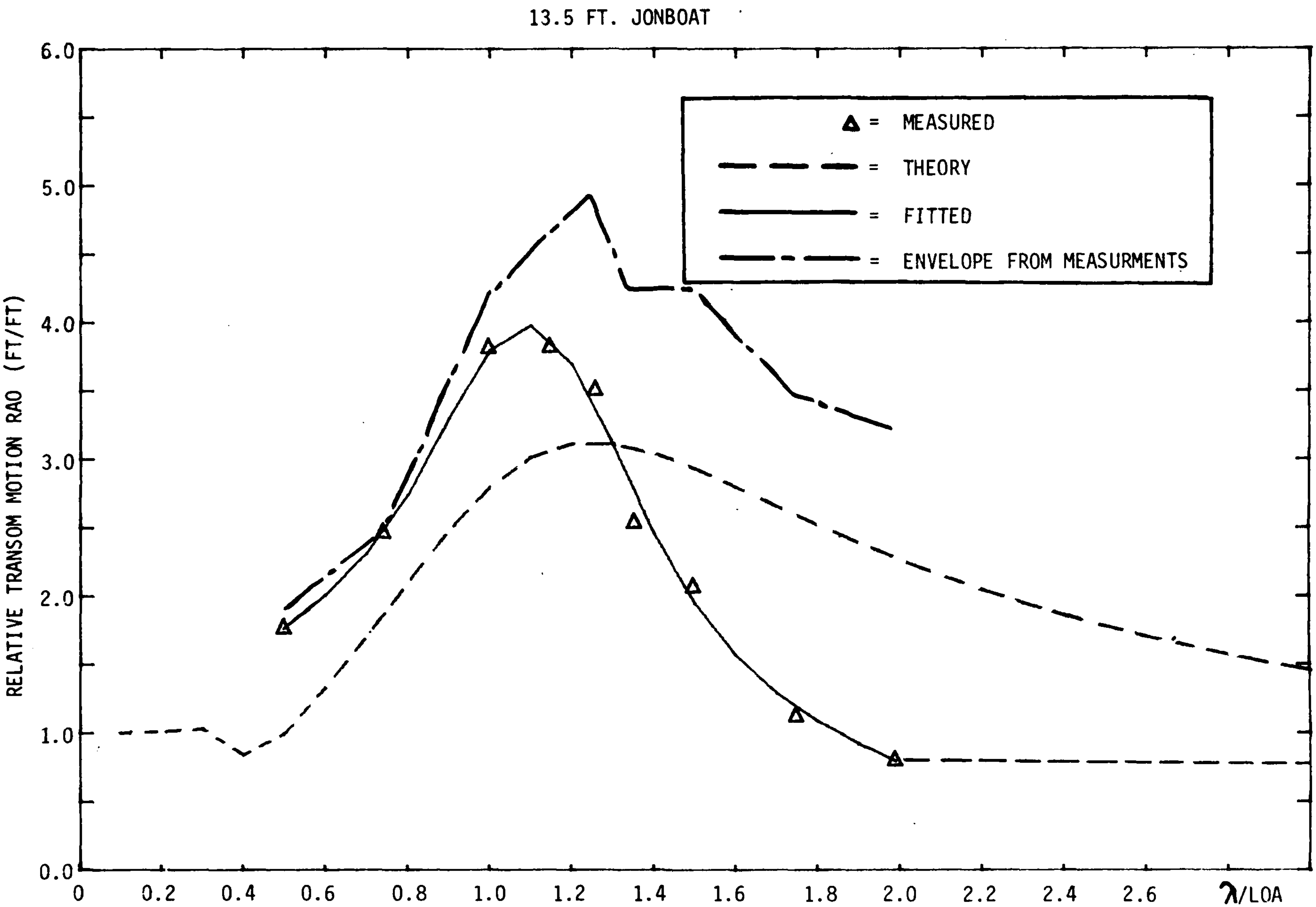

Figure 36 d. RELATIVE TRANSOM MOTION RAO, HEAD WAVES, 2 MEN FORWARD, TEST SERIES 700

13.5 FT. JONBOAT

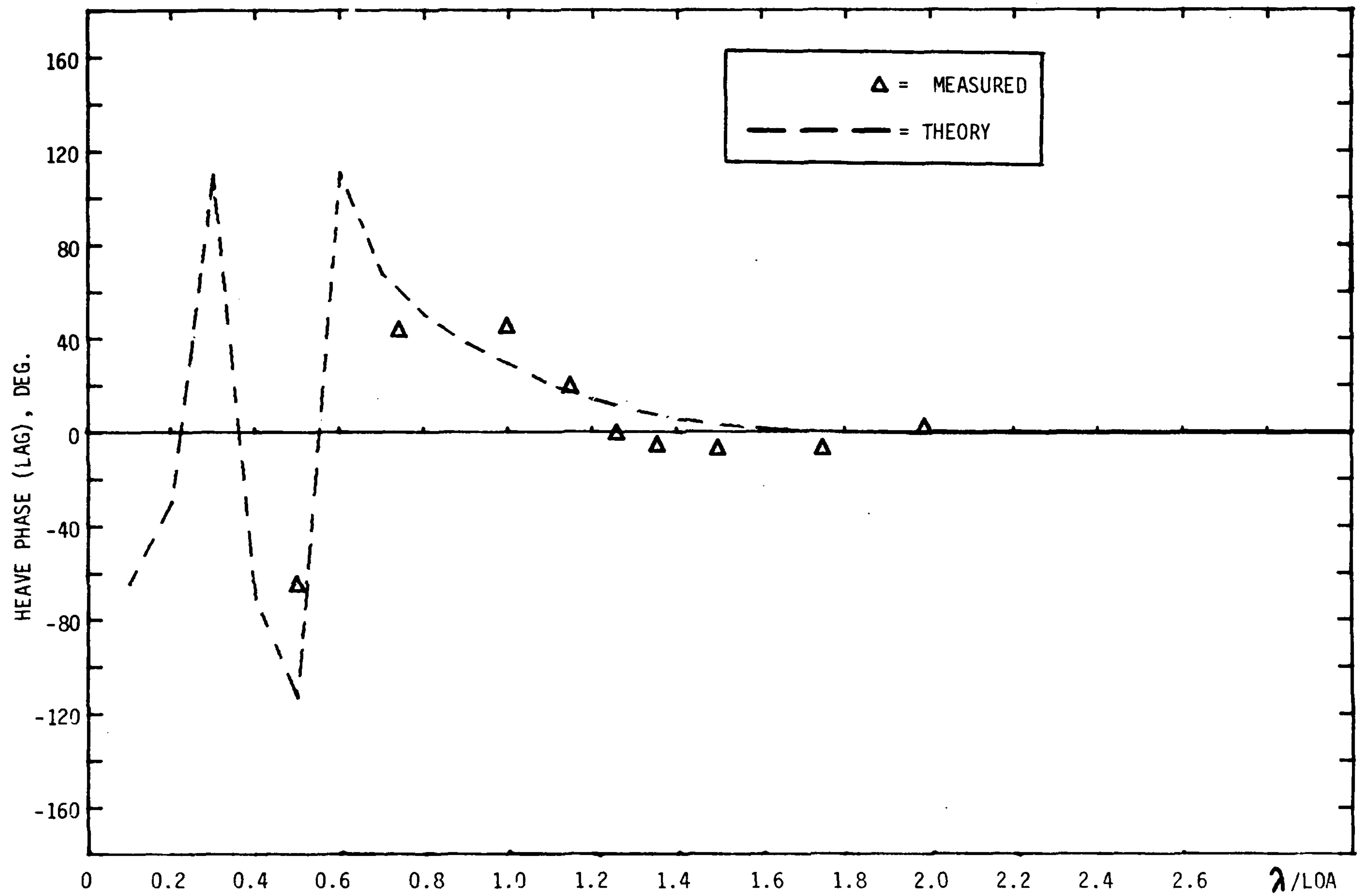

Figure 36 e. HEAVE PHASE, HEAD WAVES, 2 MEN FORWARD, TEST SERIES 700

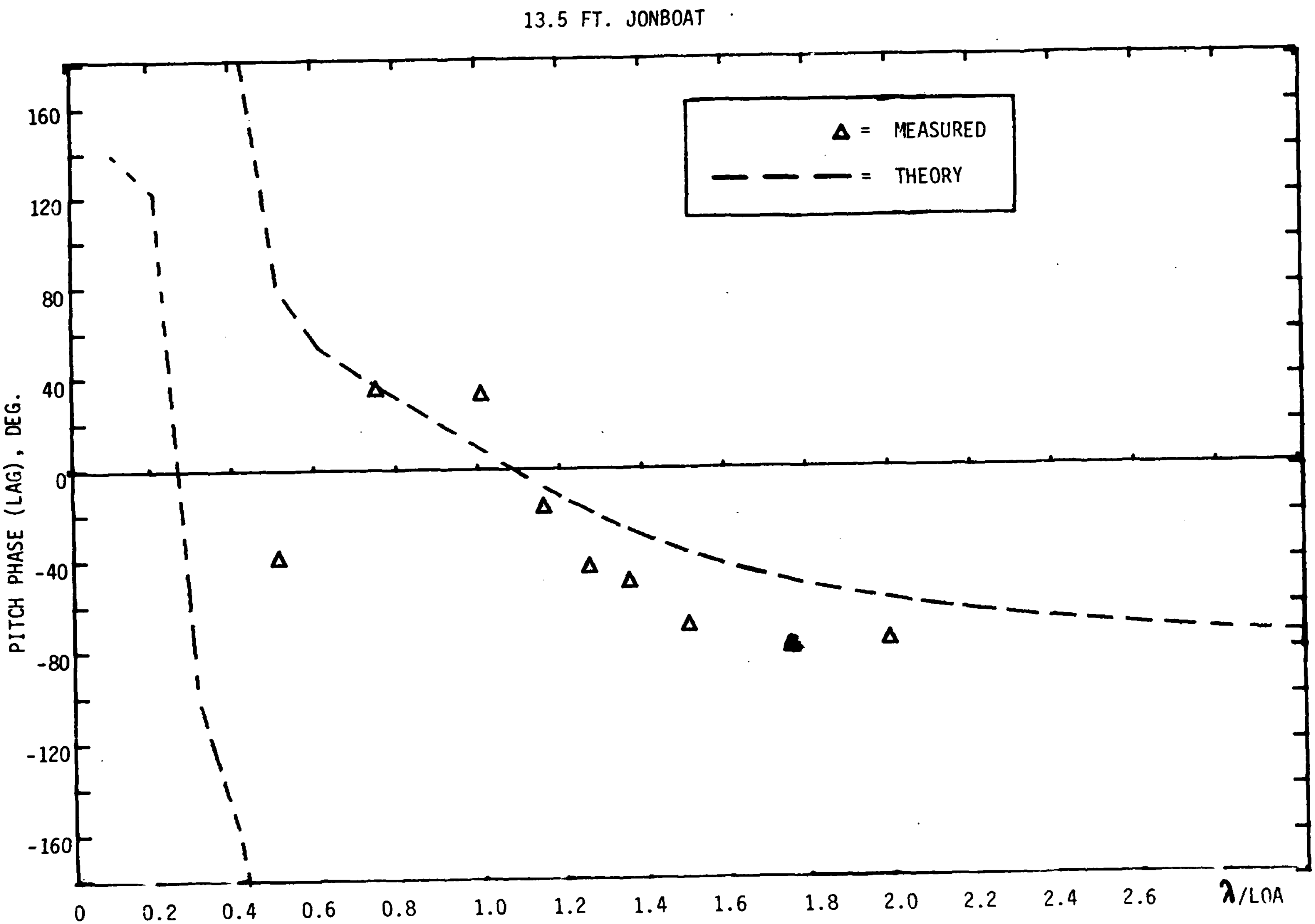

Figure 36 f. PITCH PHASE, HEAD WAVES, 2 MEN FORWARD, TEST SERIES 700

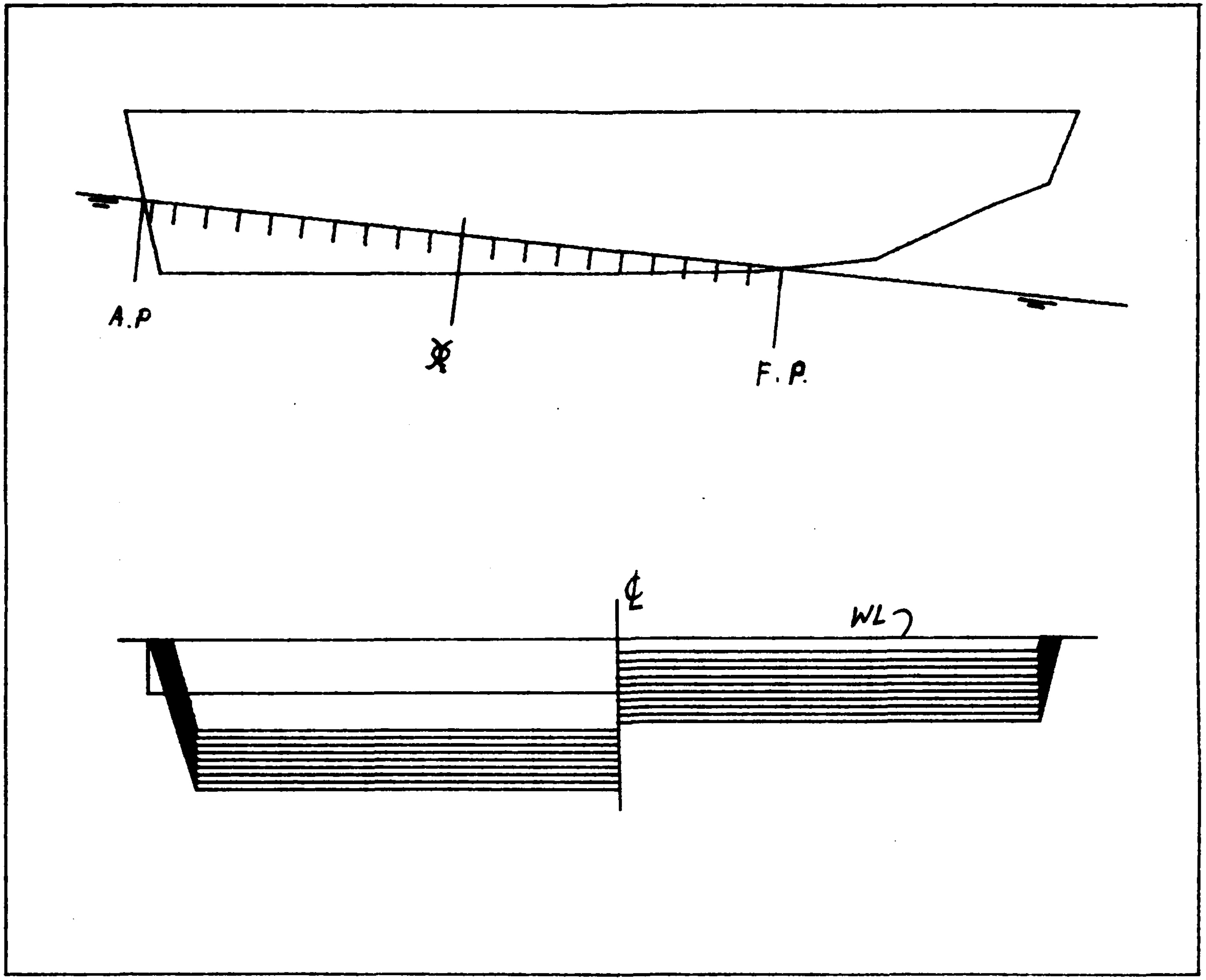

Figure 37a. UNDERBODY SHAPE OF 8-FT. DINGHY IN TEST SERIES 1100 (AS "SEEN" BY HANSEL)

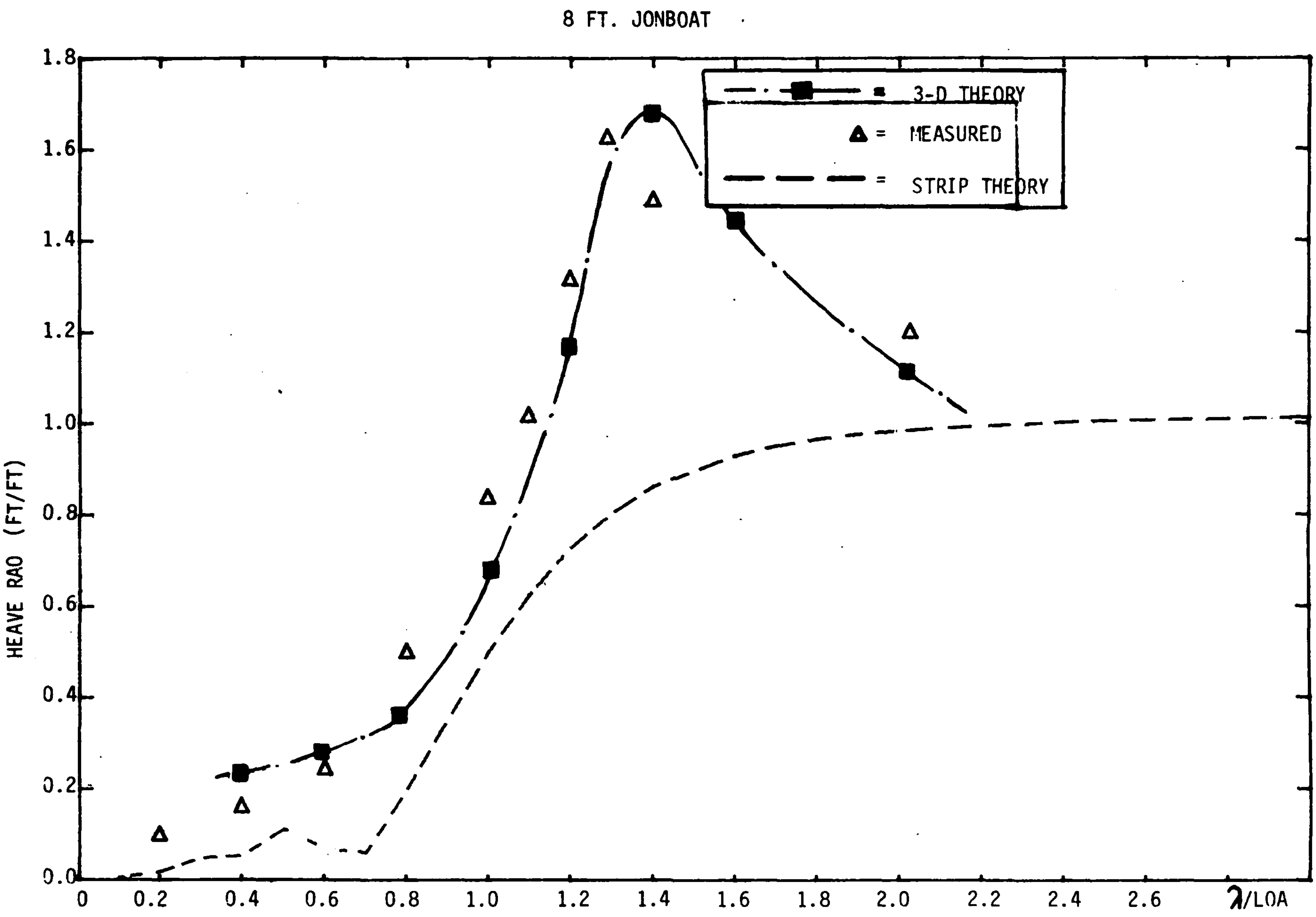

Figure 37 b. HEAVE RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1100

8 FT. JONBOAT

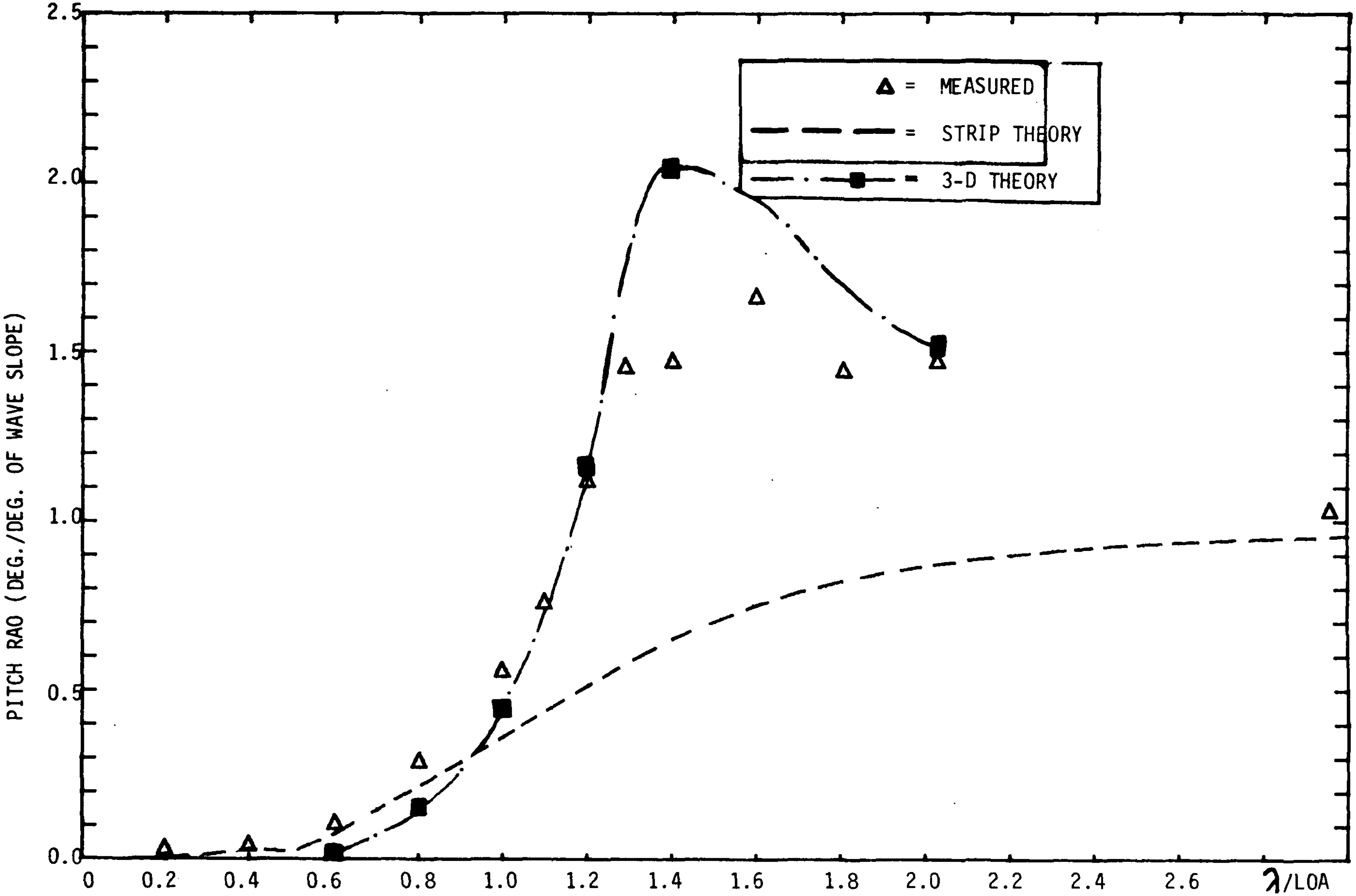

Figure 37 c. PITCH RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1100

8 FT. JONBOAT

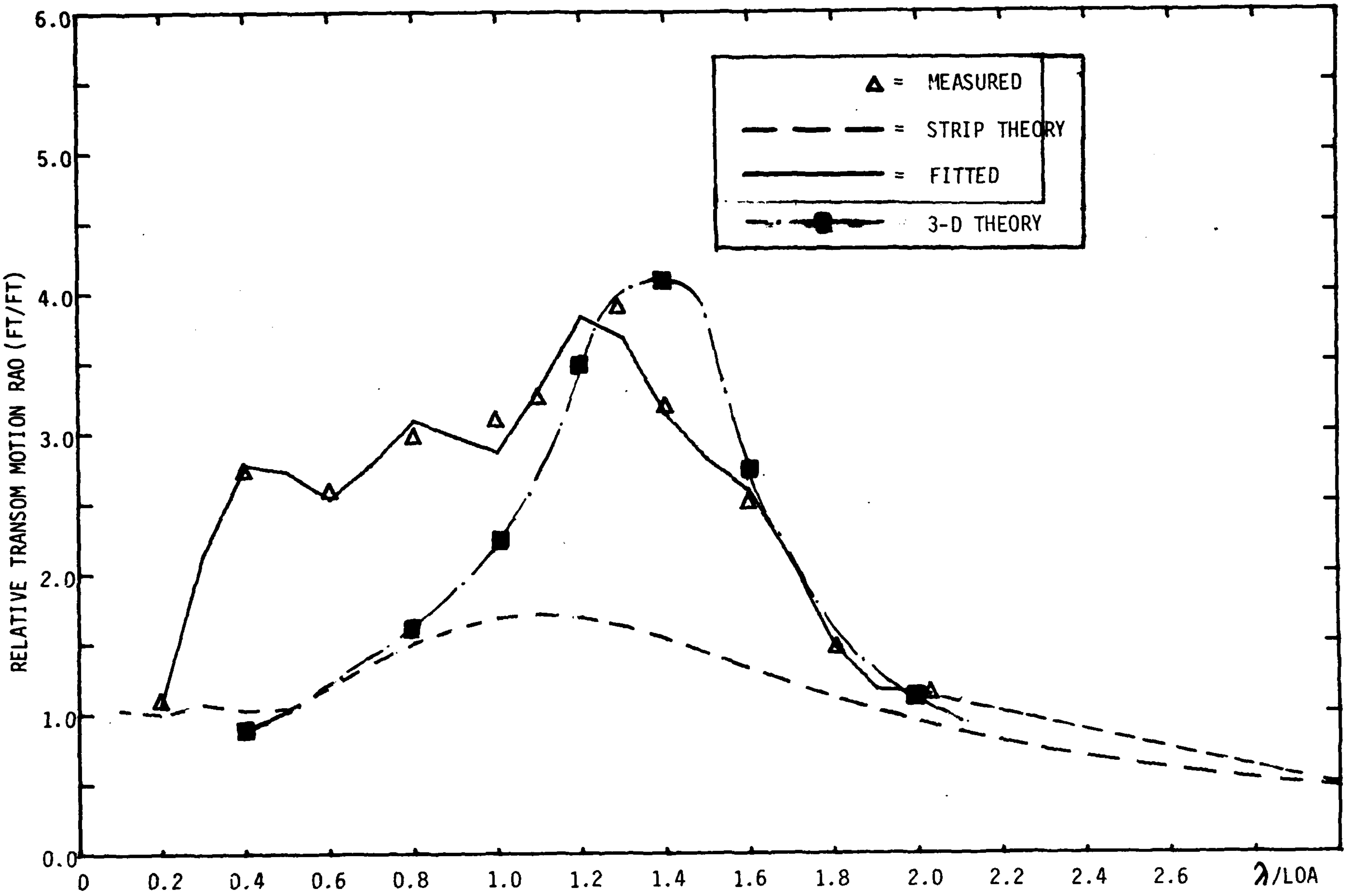

Figure 37 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1100

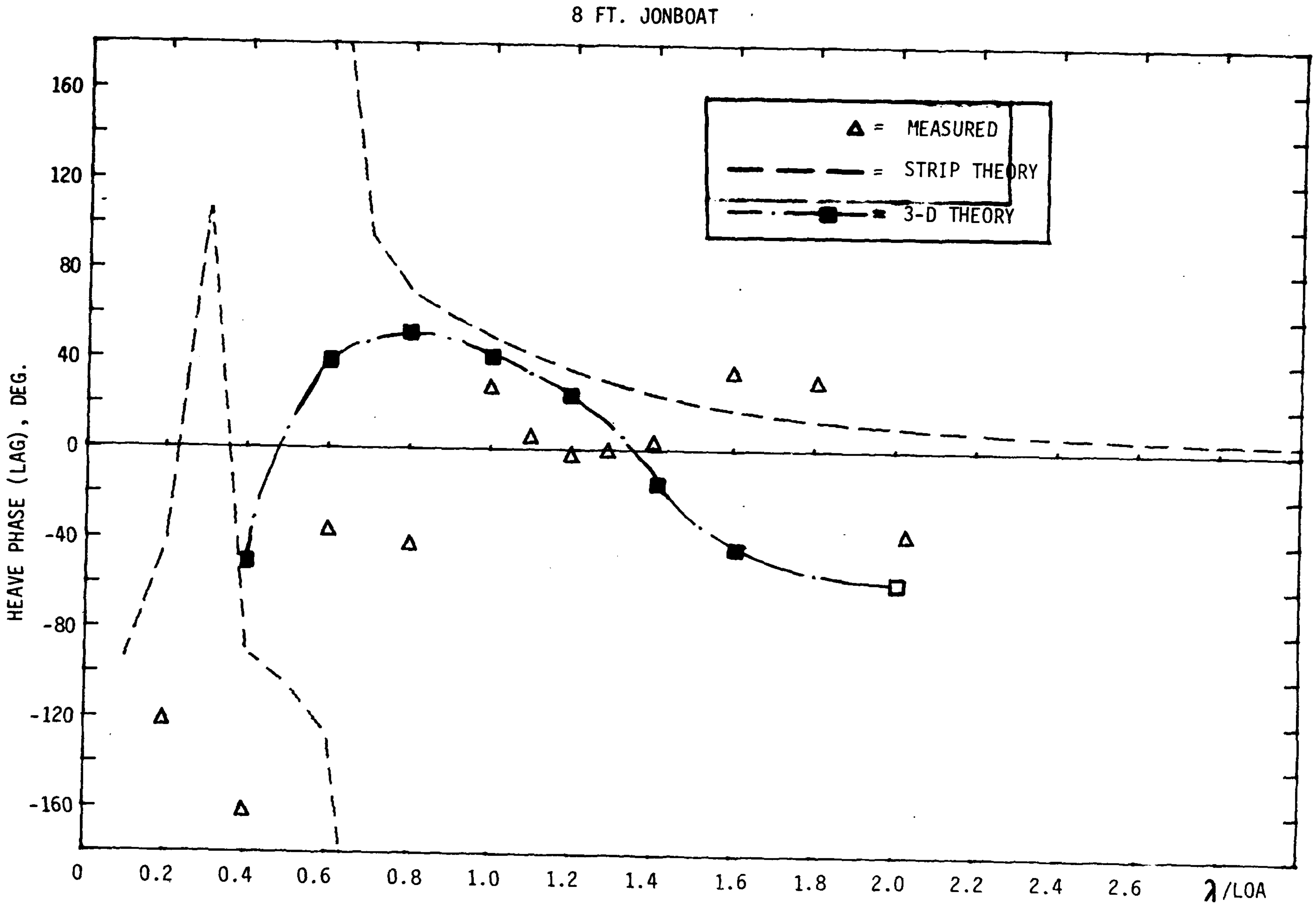

Figure 37 e. HEAVE PHASE, STERN WAVES, 1 MAN AFT, TEST SERIES 1100

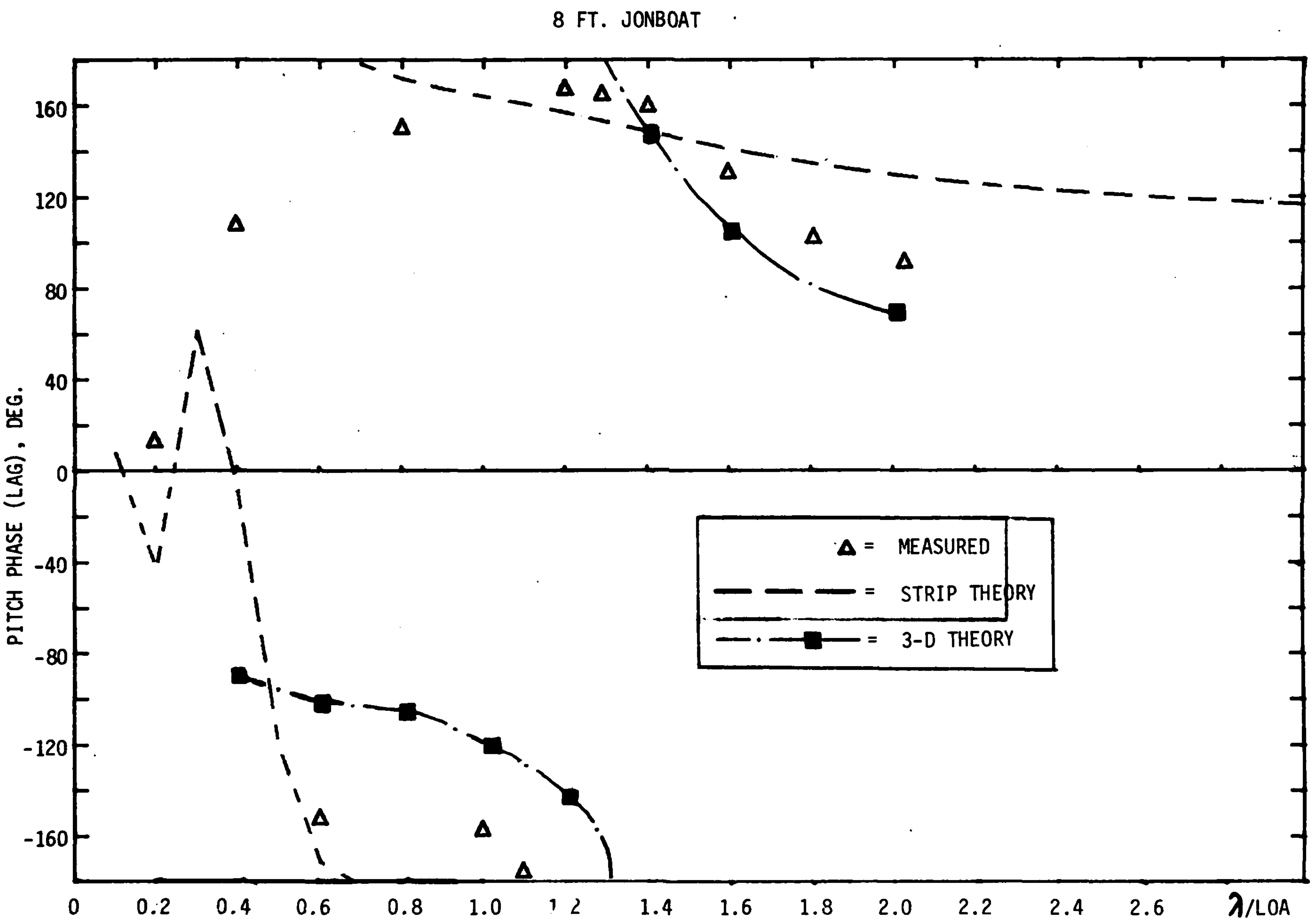

Figure 37 f. PITCH PHASE, STERN WAVES, 1 MAN AFT, TEST SERIES 1100

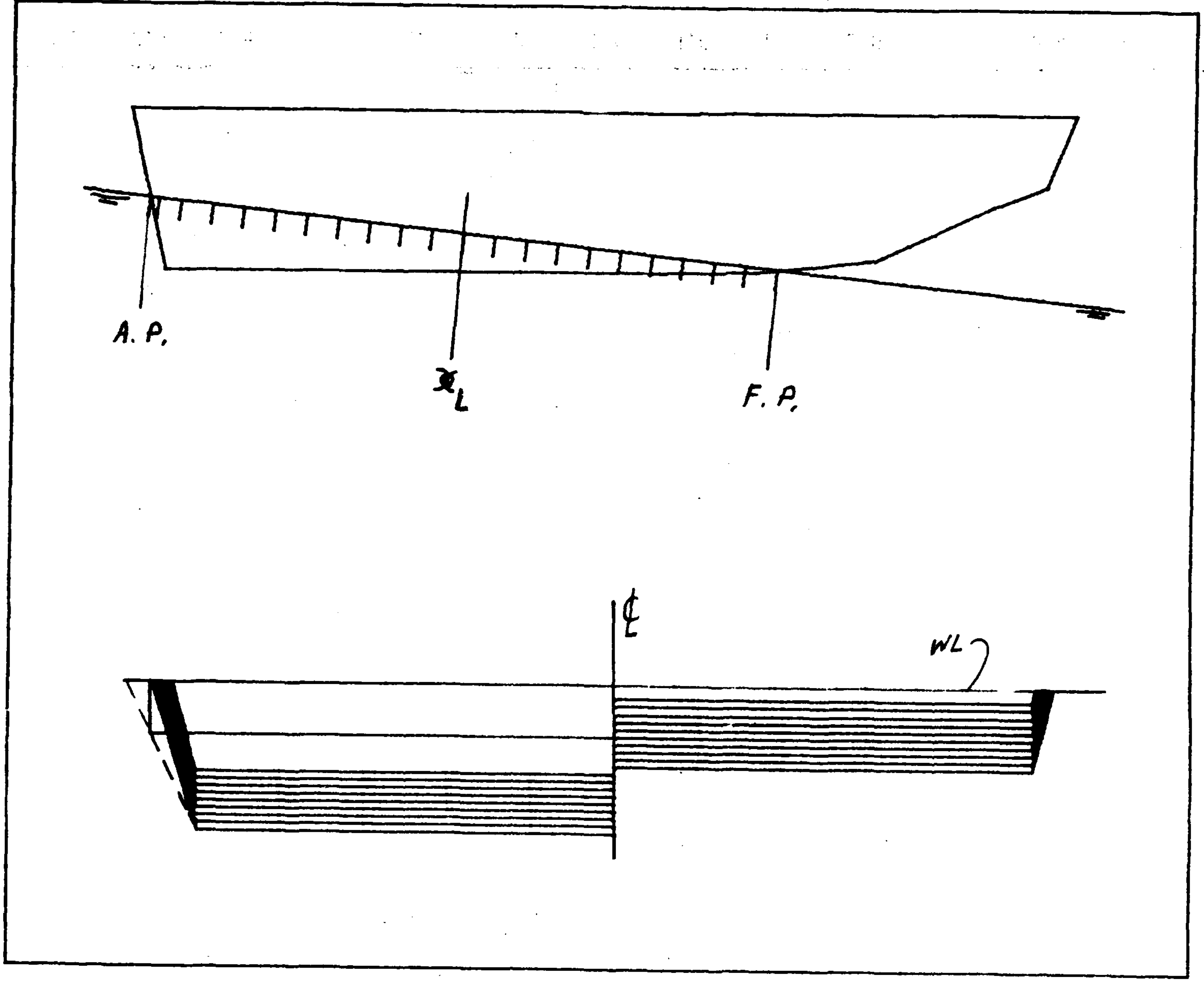

Figure 38a. UNDERBODY SHAPE OF 8-FOOT DINGHY IN TEST SERIES 1300 (AS "SEEN" BY HANSEL)

8 FT. JONBOAT

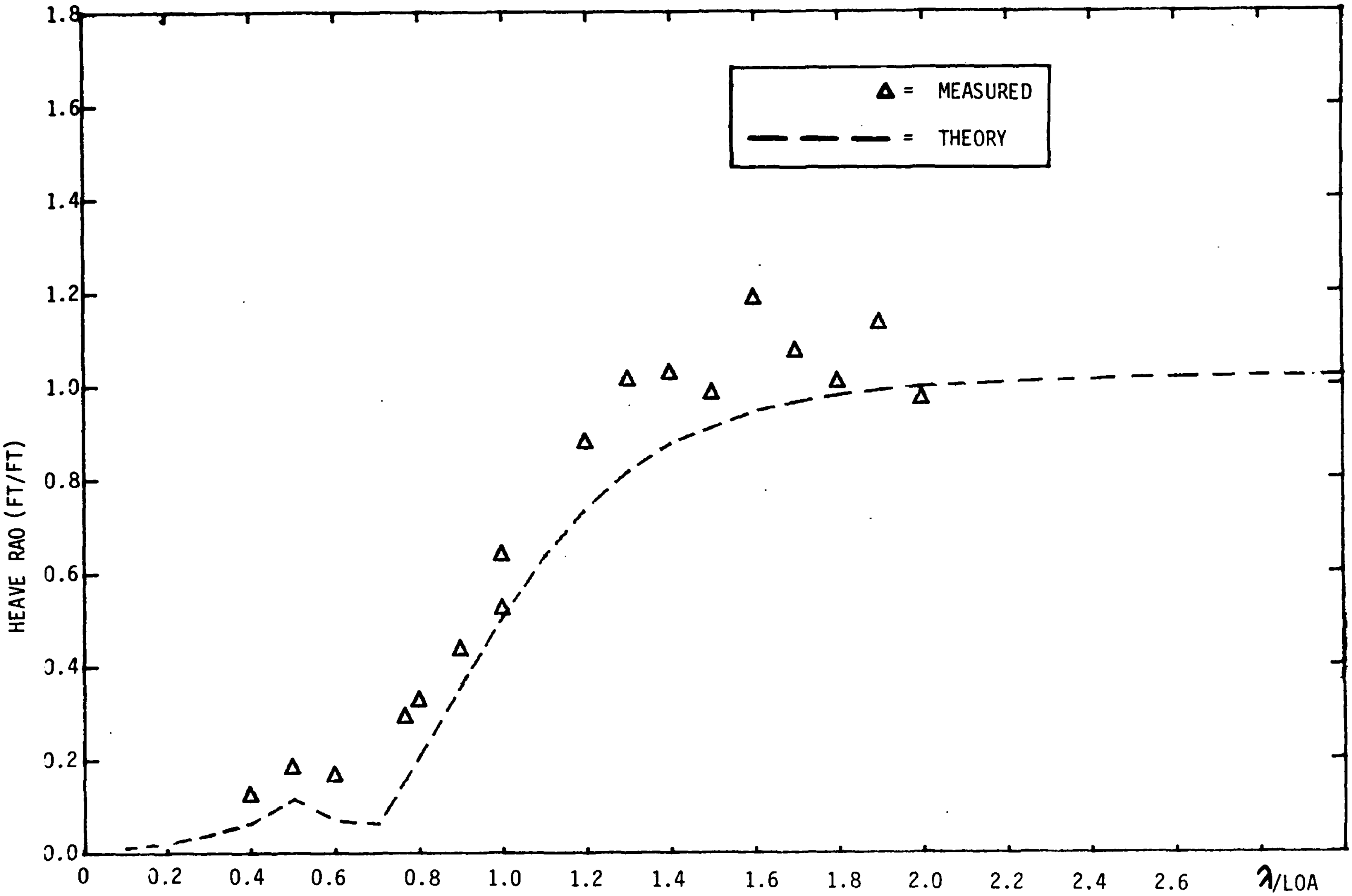

Figure 38 b. HEAVE RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1300

8 FT. JONBOAT

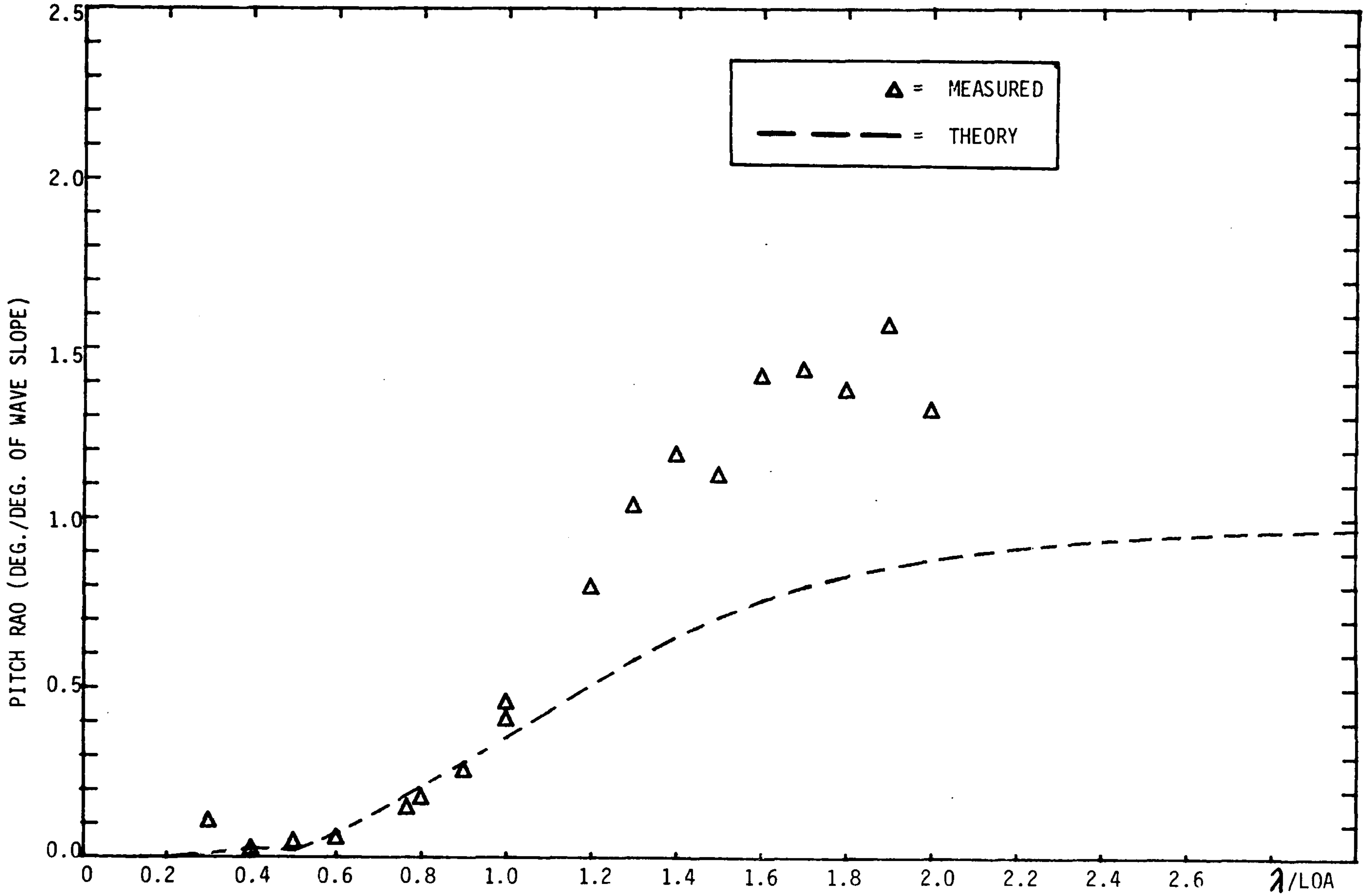

Figure 38 c. PITCH RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1300

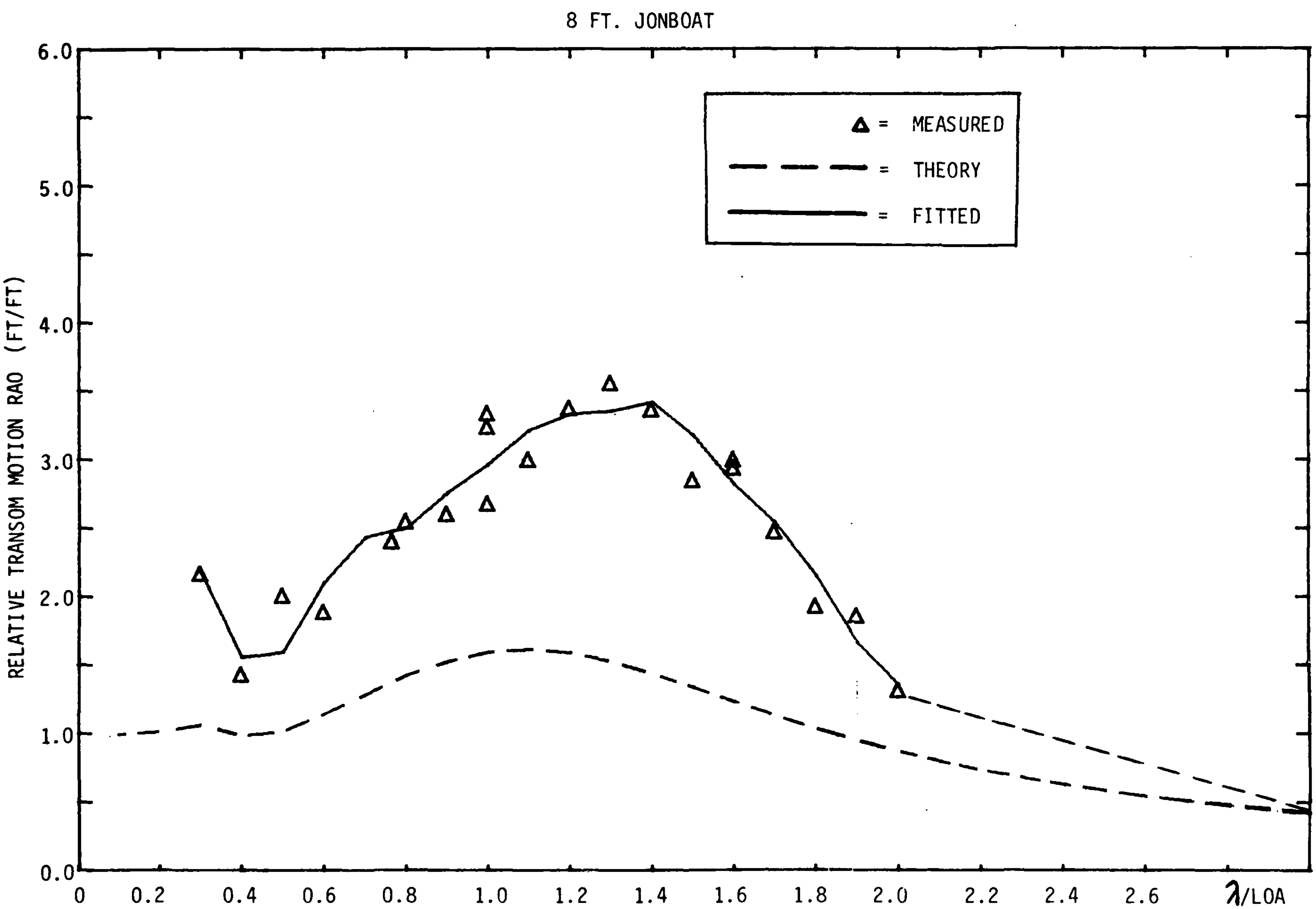

Figure 38 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 1300

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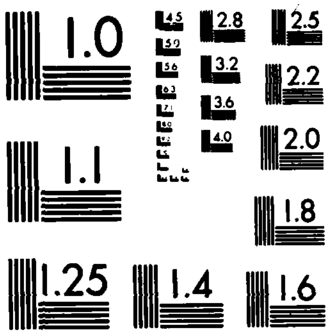

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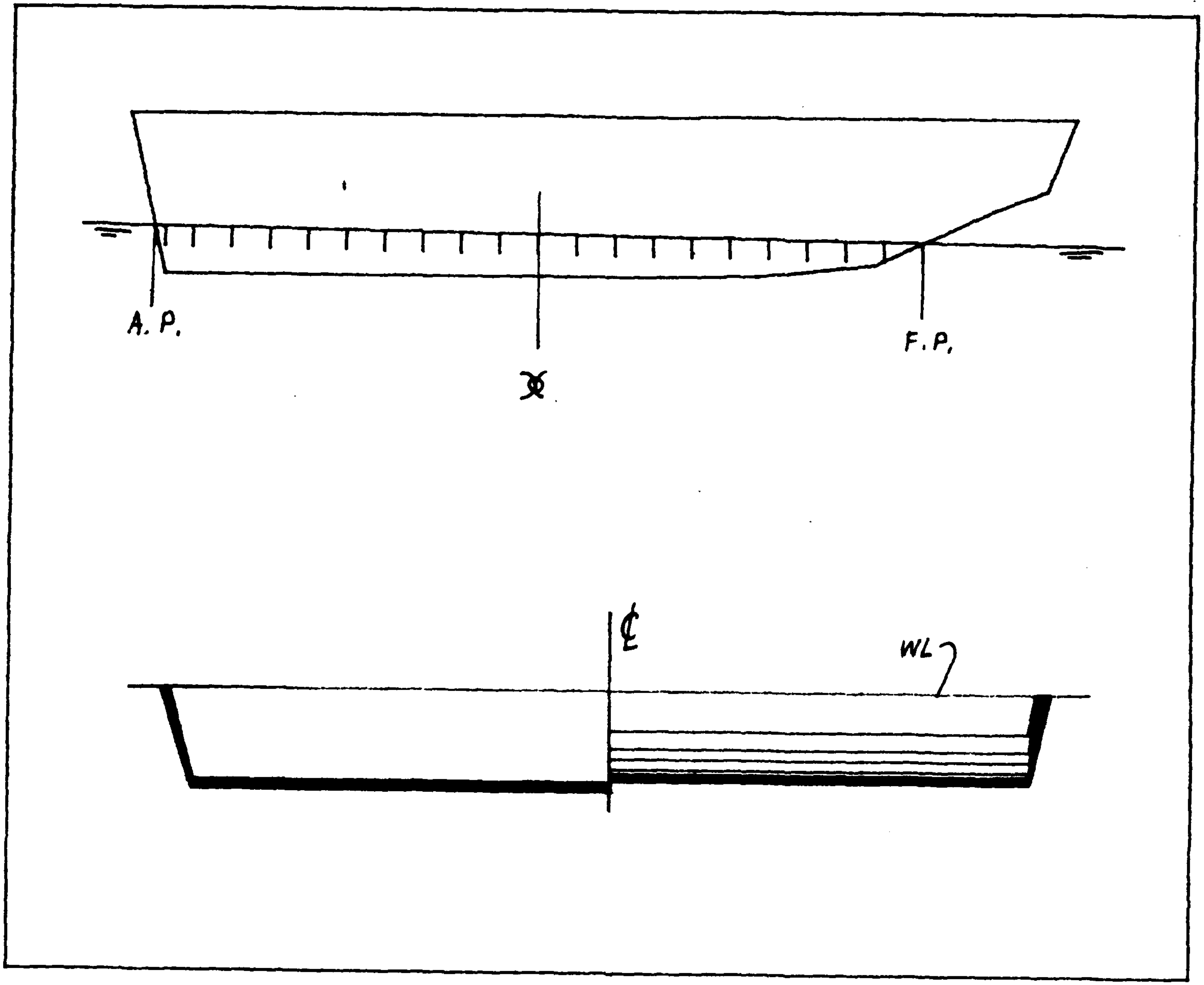

Figure 39a. UNDERBODY SHAPE OF 8-FOOT DINGHY IN TEST SERIES 1500 (AS "SEEN" BY HANSEL)

8 FT. JONBOAT

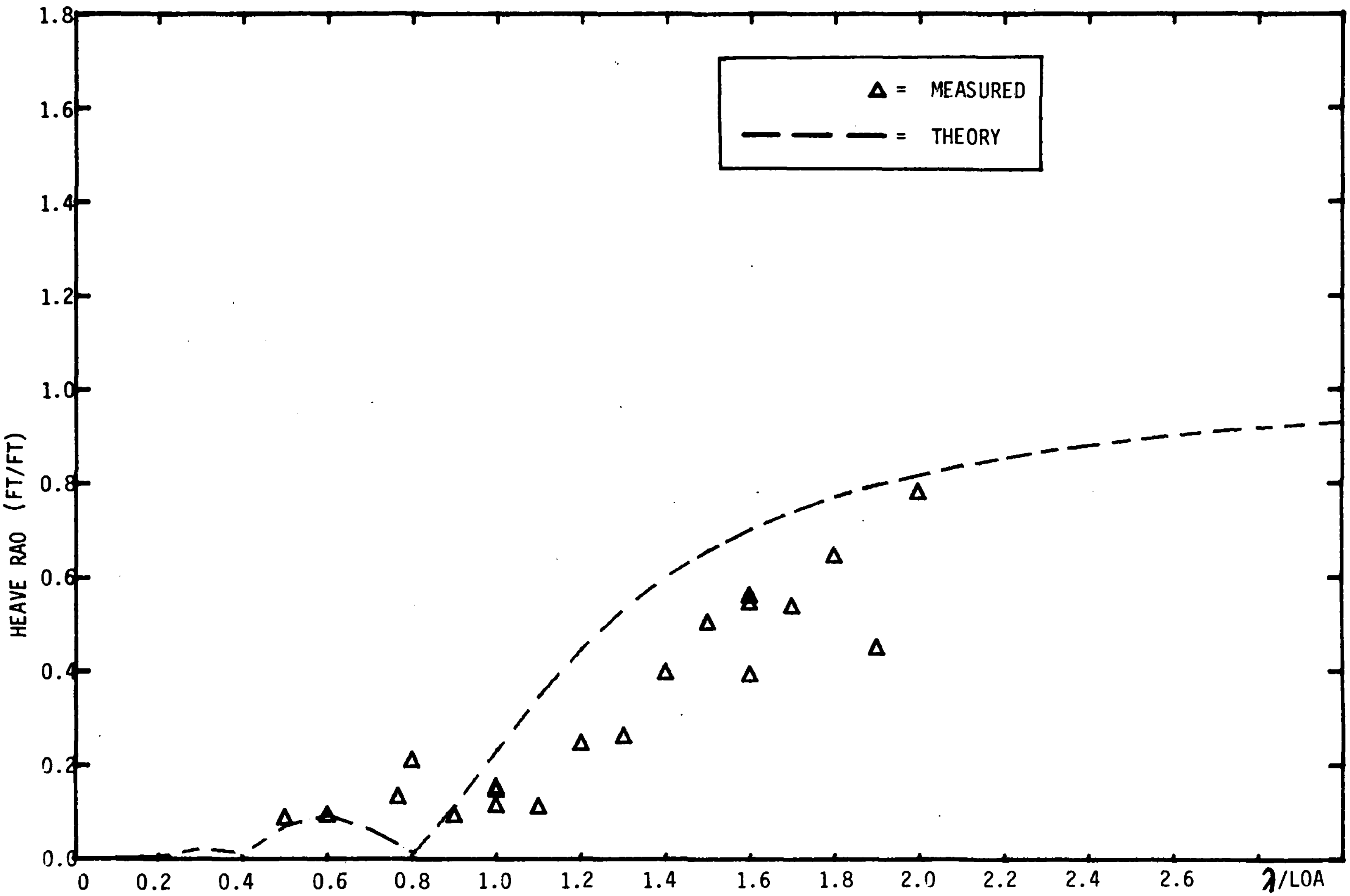

Figure 39 b. HEAVE RAO, HEAD WAVES, EVEN KEEL, TEST SERIES 1500

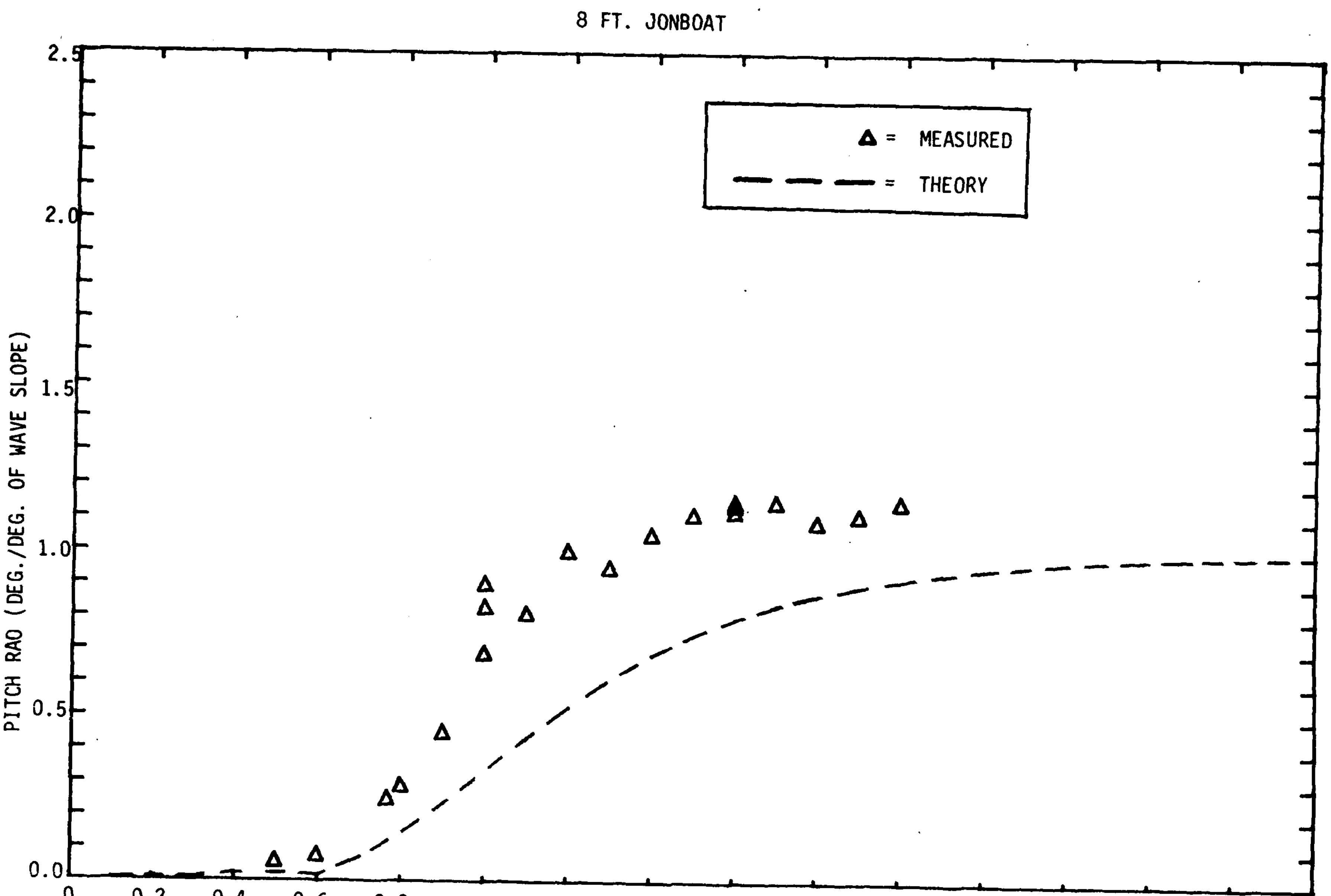

Figure 39 c. PITCH RAO, HEAD WAVES, EVEN KEEL, TEST SERIES 1500

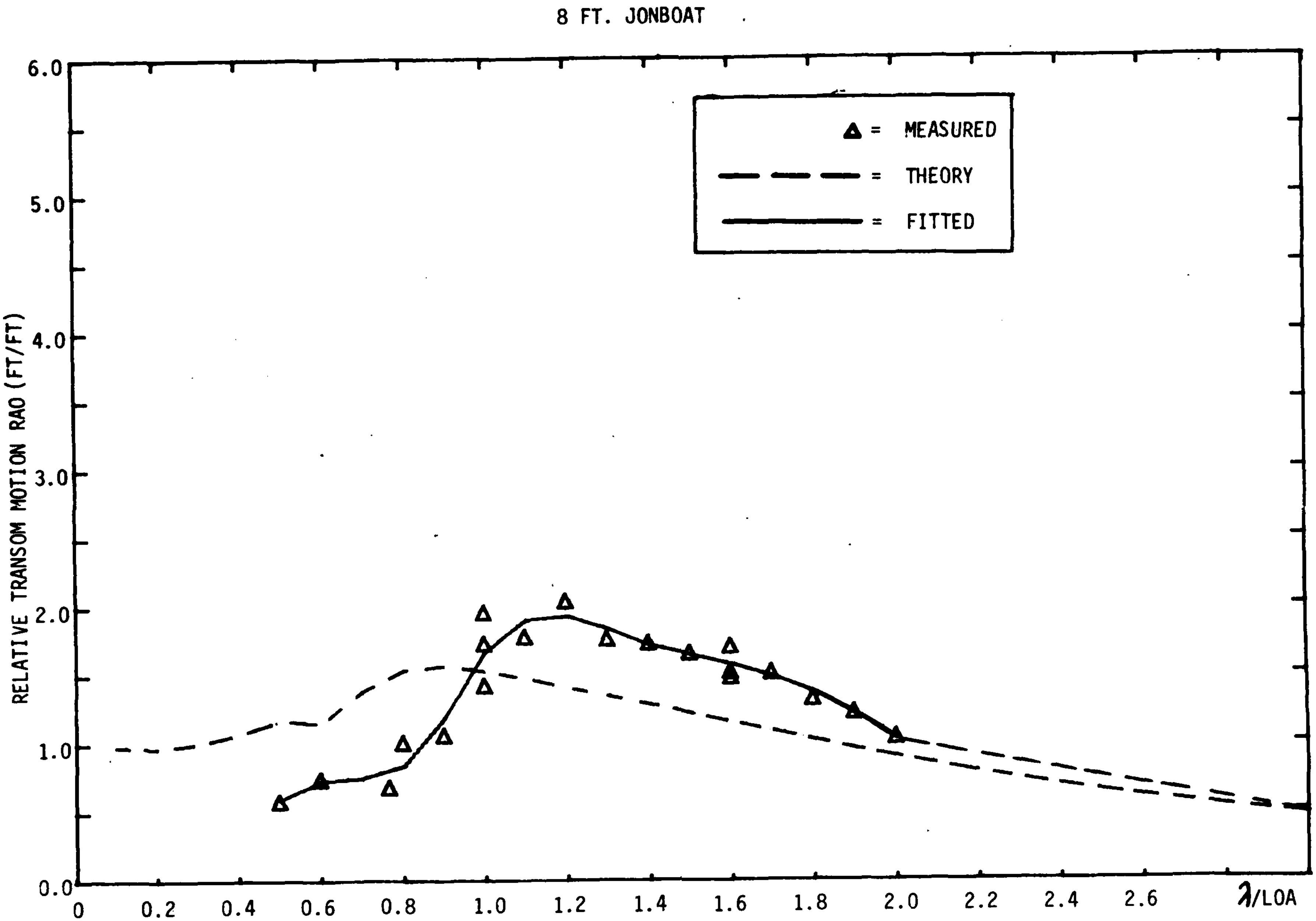

Figure 39 d. RELATIVE TRANSOM MOTION RAO, HEAD WAVES, EVEN KEEL, TEST SERIES 1500

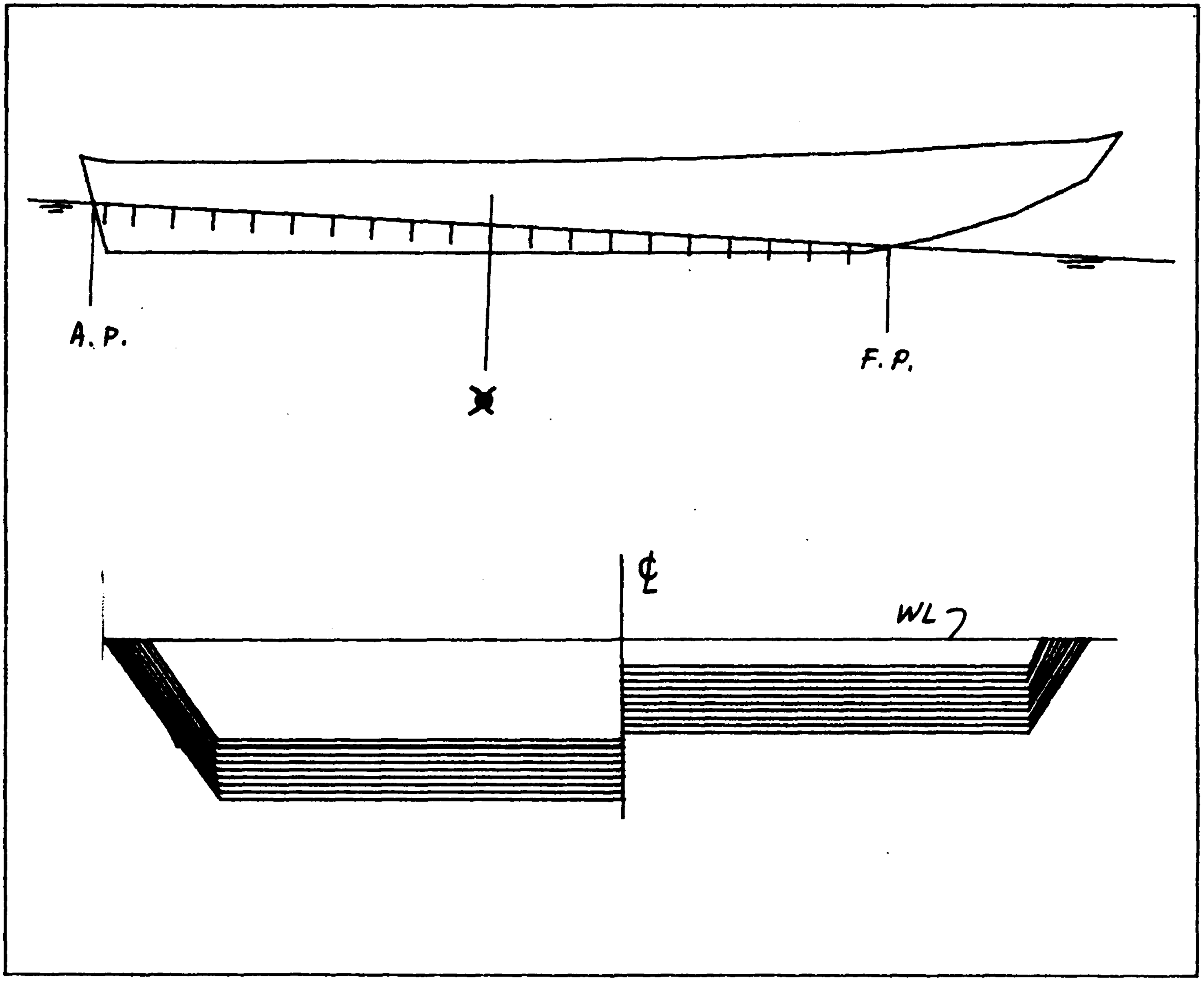

Figure 40a. UNDERBODY SHAPE OF 14-FOOT JONBOAT IN TEST SERIES 1700 (AS "SEEN" BY HANSEL)

14 FT. JONBOAT

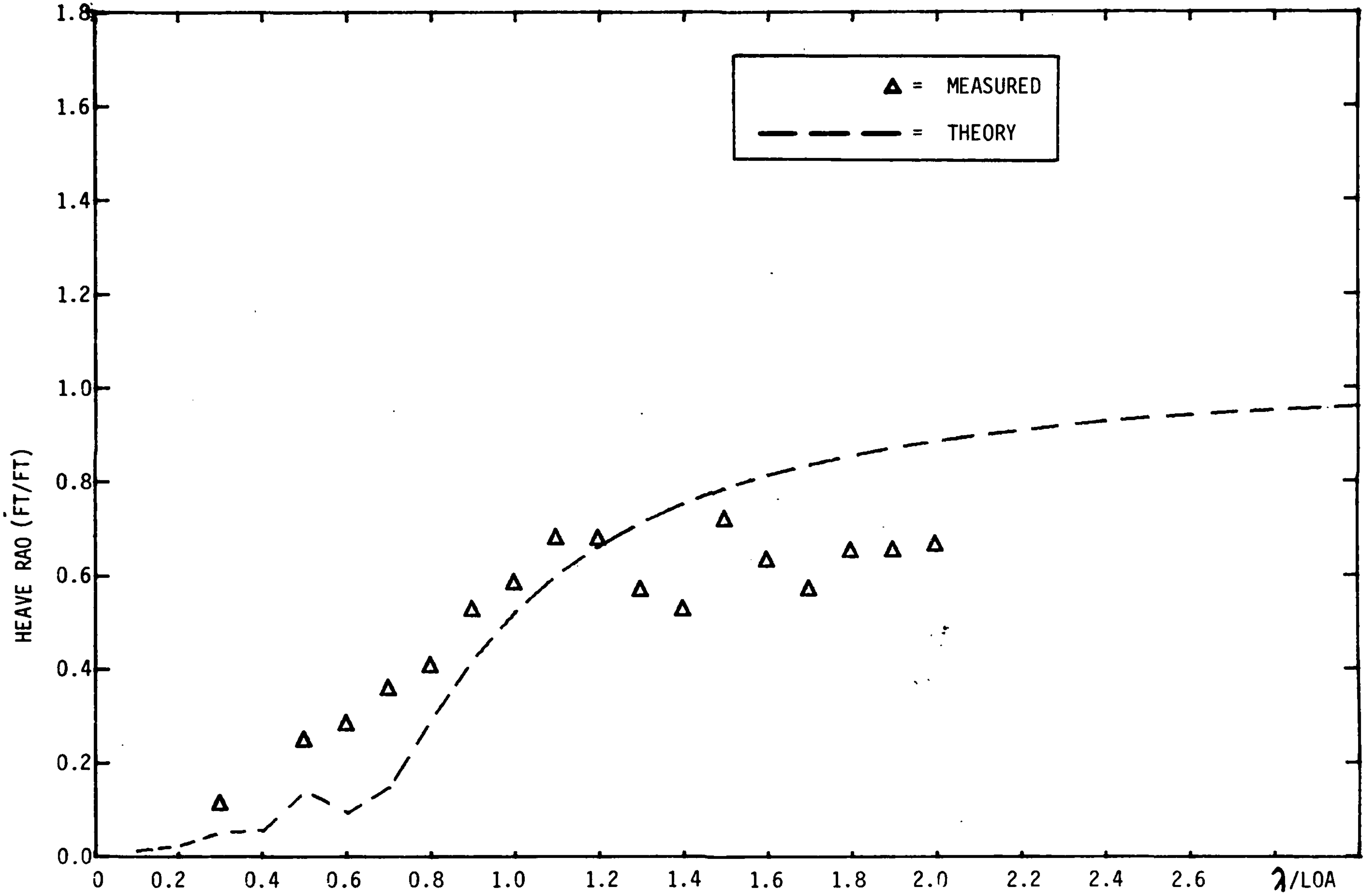

Figure 40 b. HEAVE RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 1700

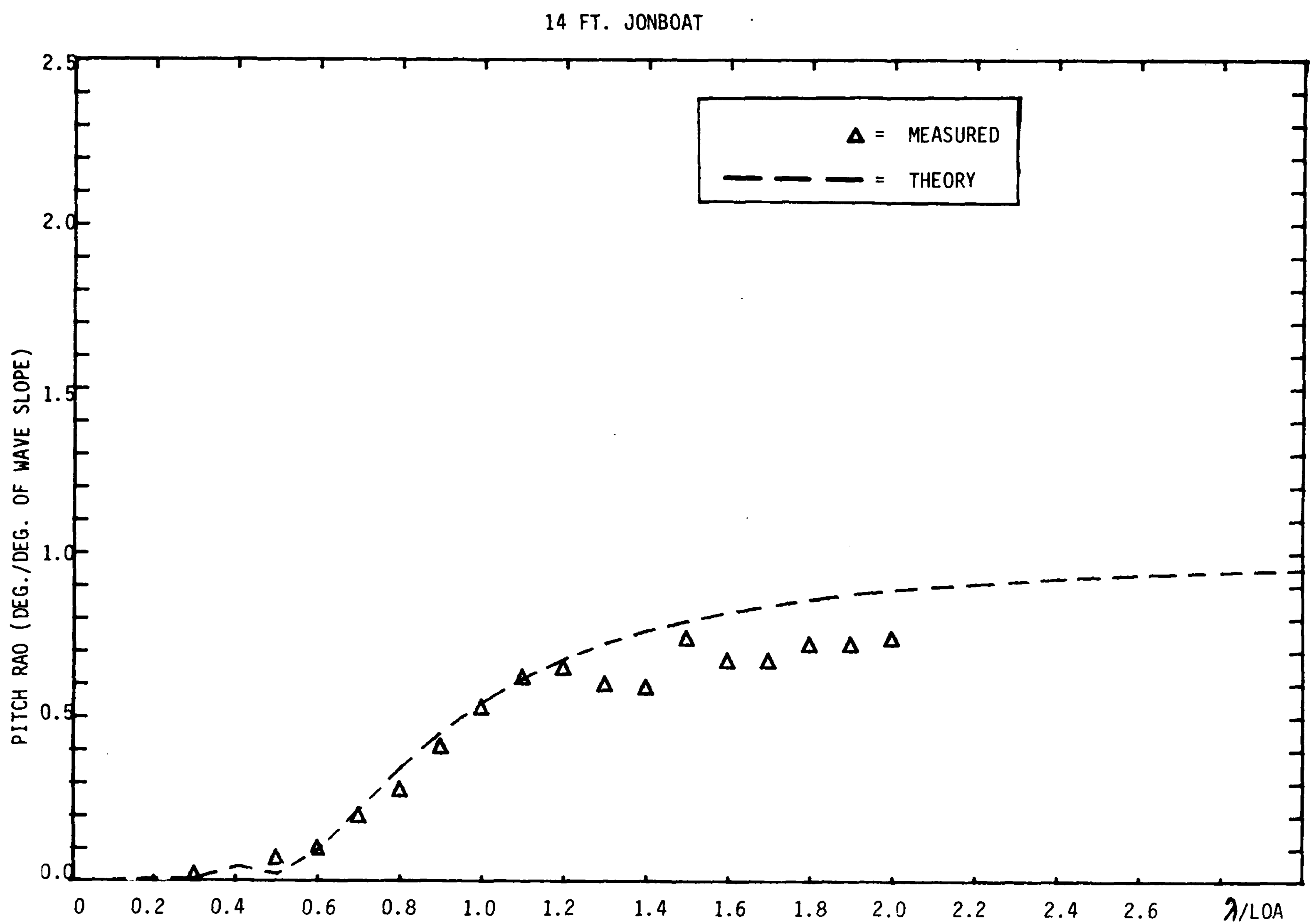

Figure 40c. PITCH RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 1700

14 FT. JONBOAT

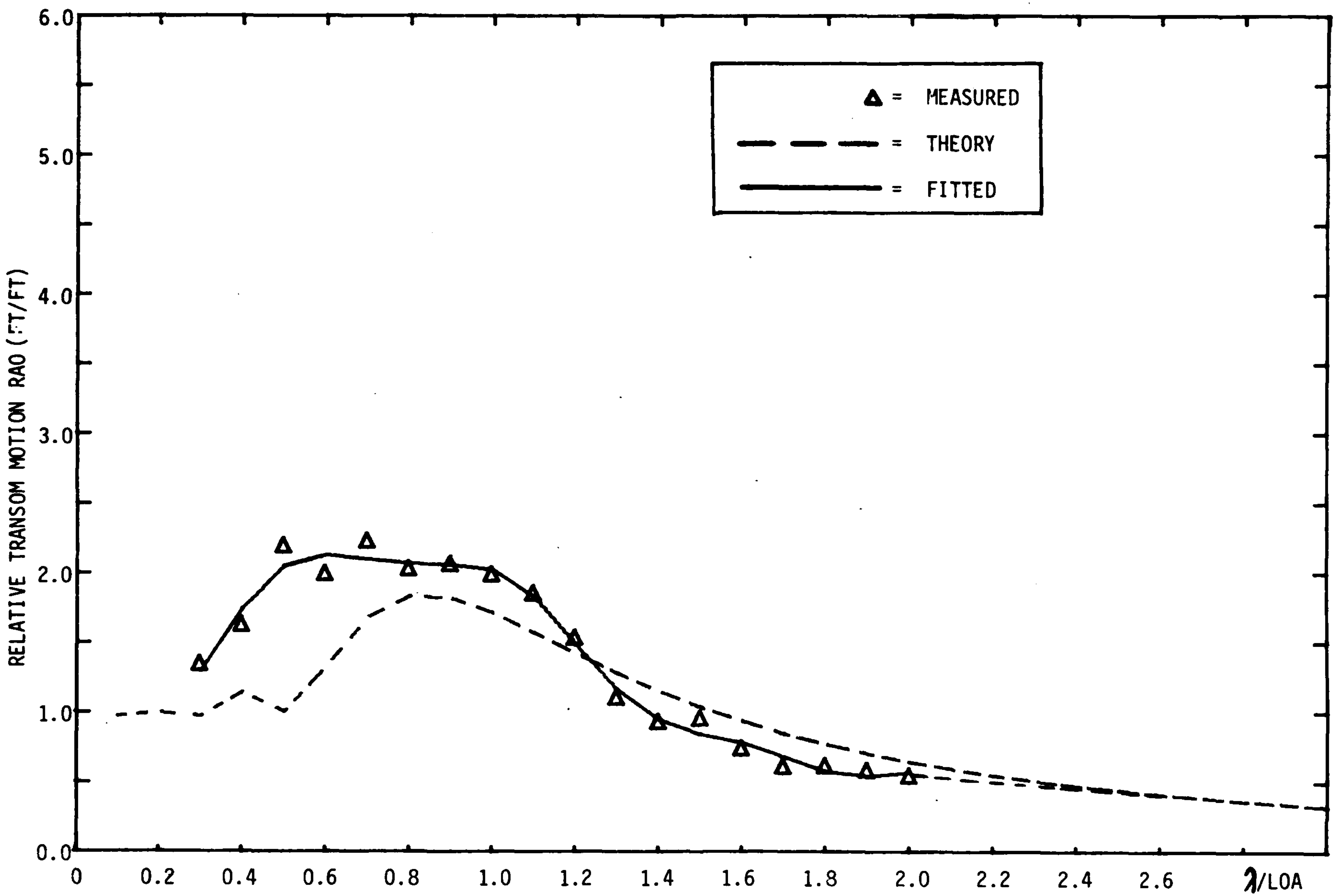

Figure 40 d. RELATIVE TRANSOM MOTION RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIPS, TEST SERIES 1700

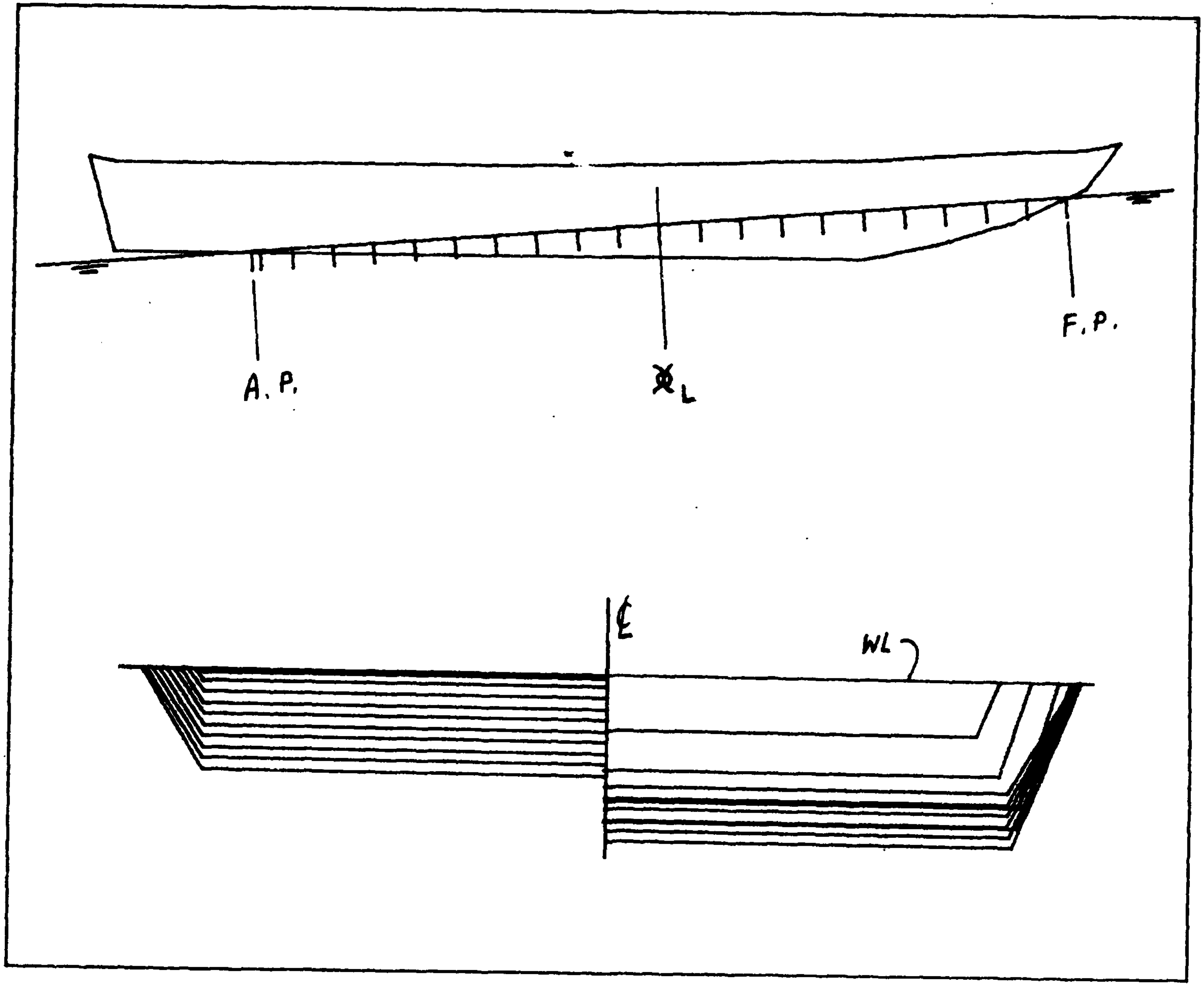

Figure 41a. UNDERBODY SHAPE OF 14-FOOT JONBOAT IN TEST SERIES 1900 (AS "SEEN" BY HANSEL)

14 FT. JONBOAT

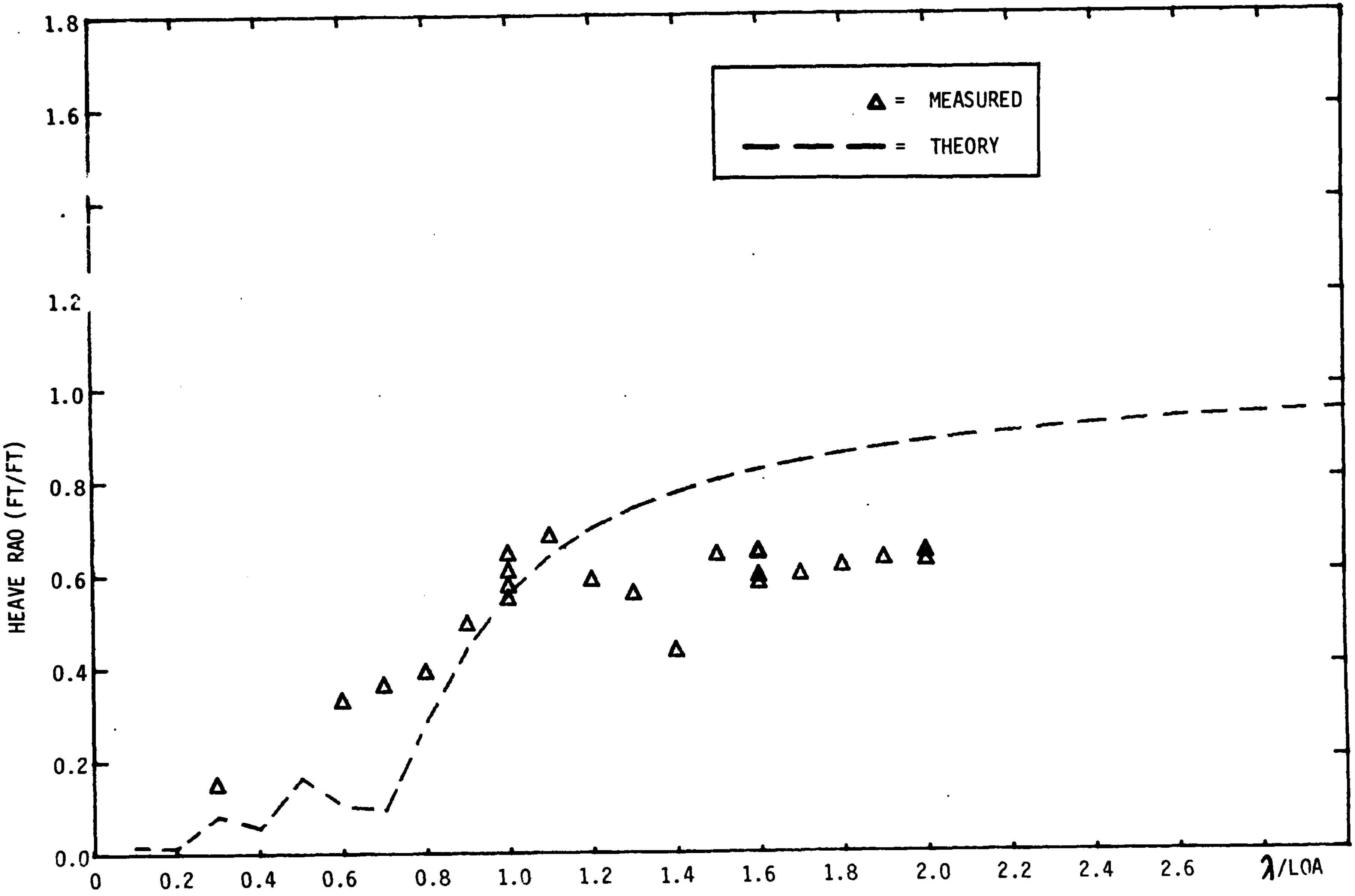

Figure 41 b. HEAVE RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 1900

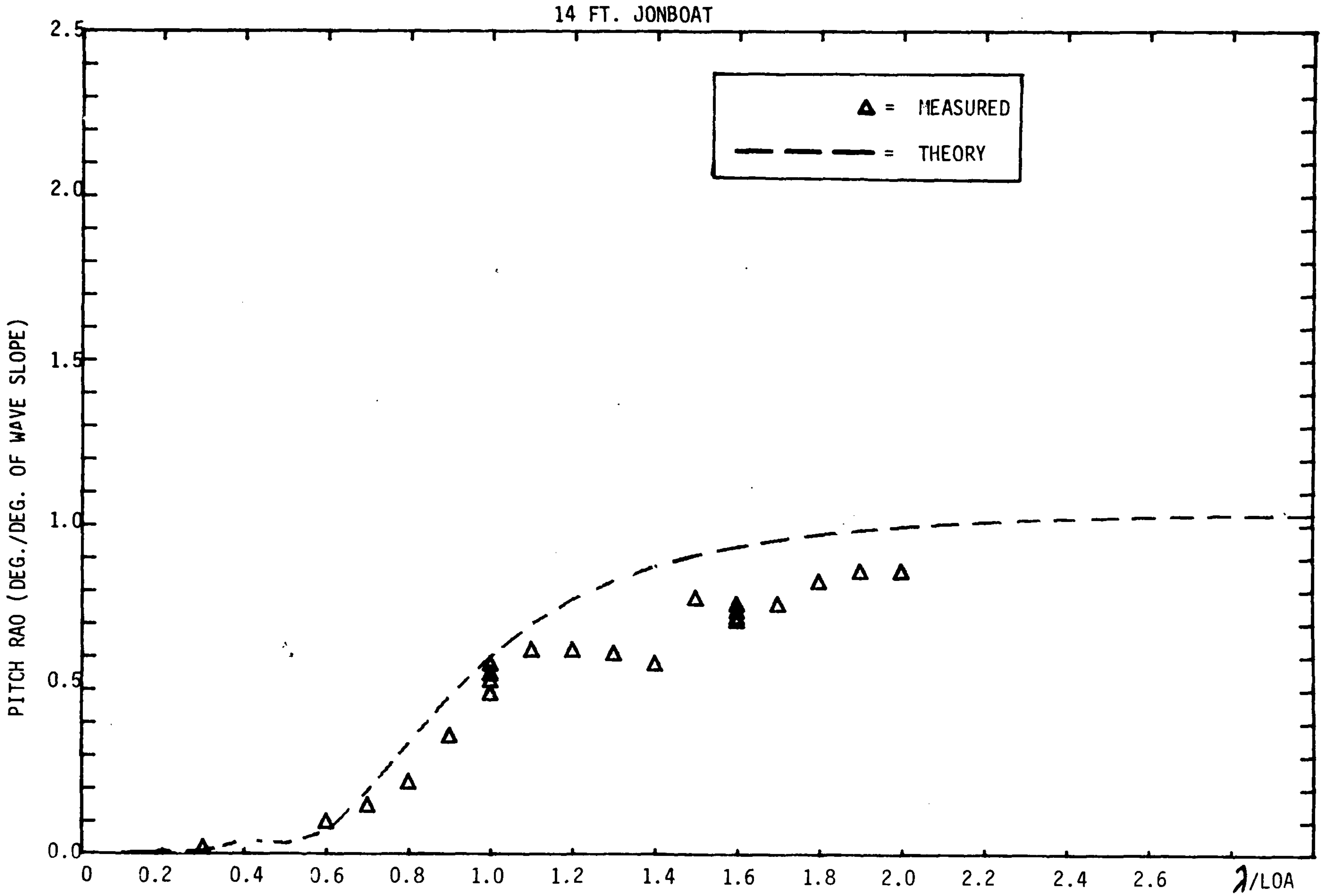

Figure 41 c. PITCH RAO, HEAD WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP, TEST SERIES 1900

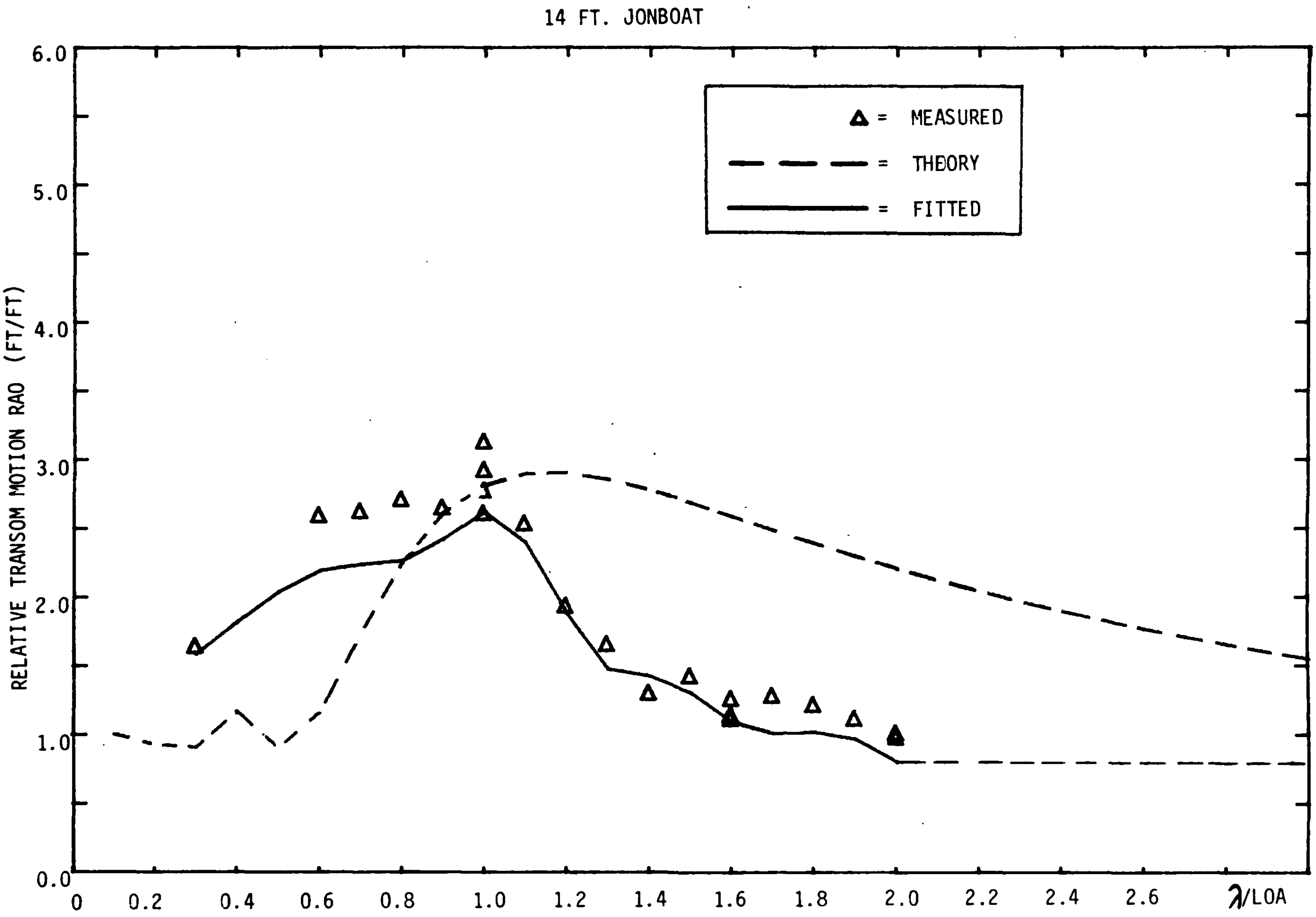

Figure 41 d. RELATIVE TRANSOM MOTION RAO, HEAD WAVES, 2 MEN FORWARD and 1 MAN MIDSHIPS, TEST SERIES 1900

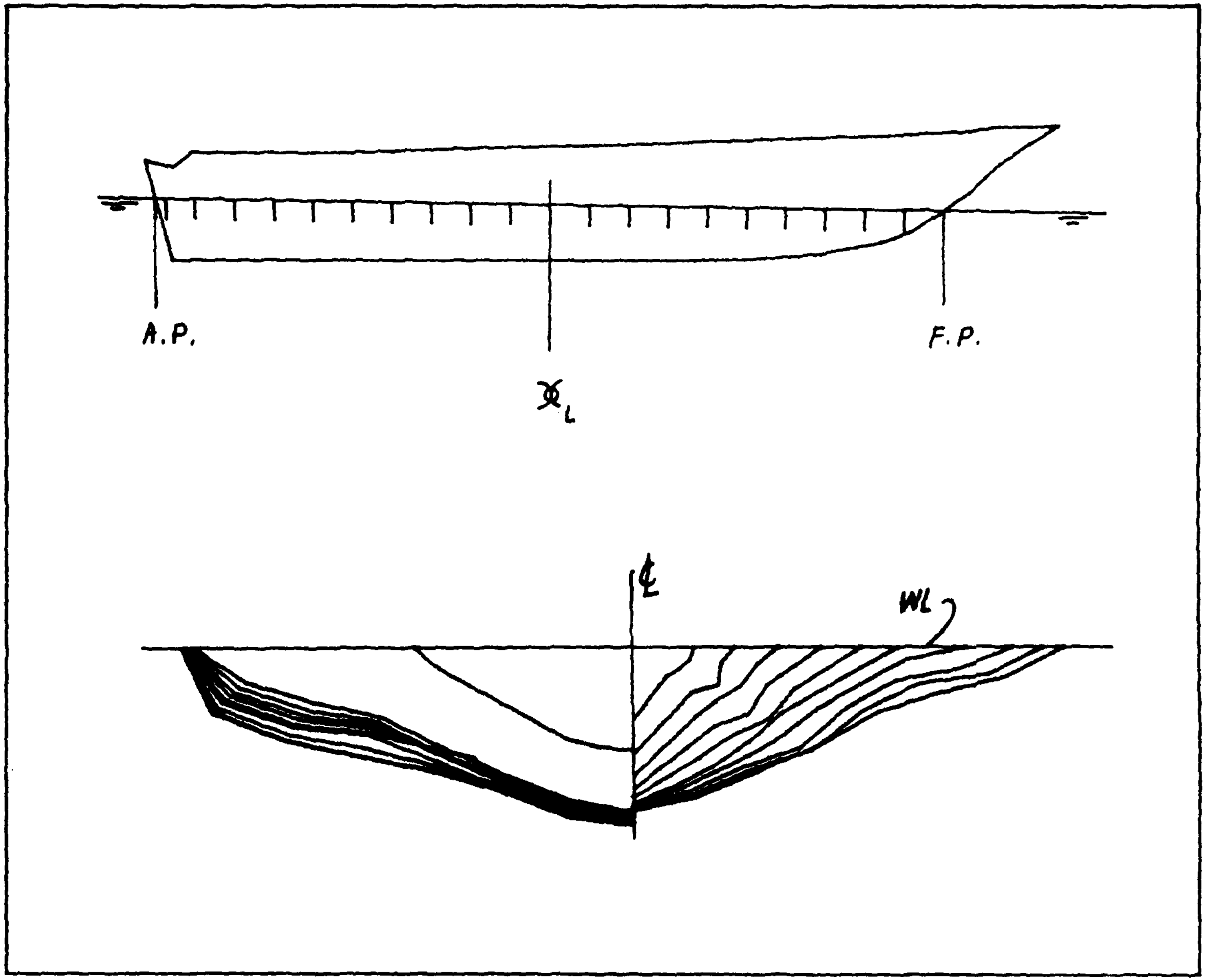

Figure 42a. UNDERBODY SHAPE OF RUNABOUT IN TEST SERIES 2000 (AS "SEEN" BY HANSEL)

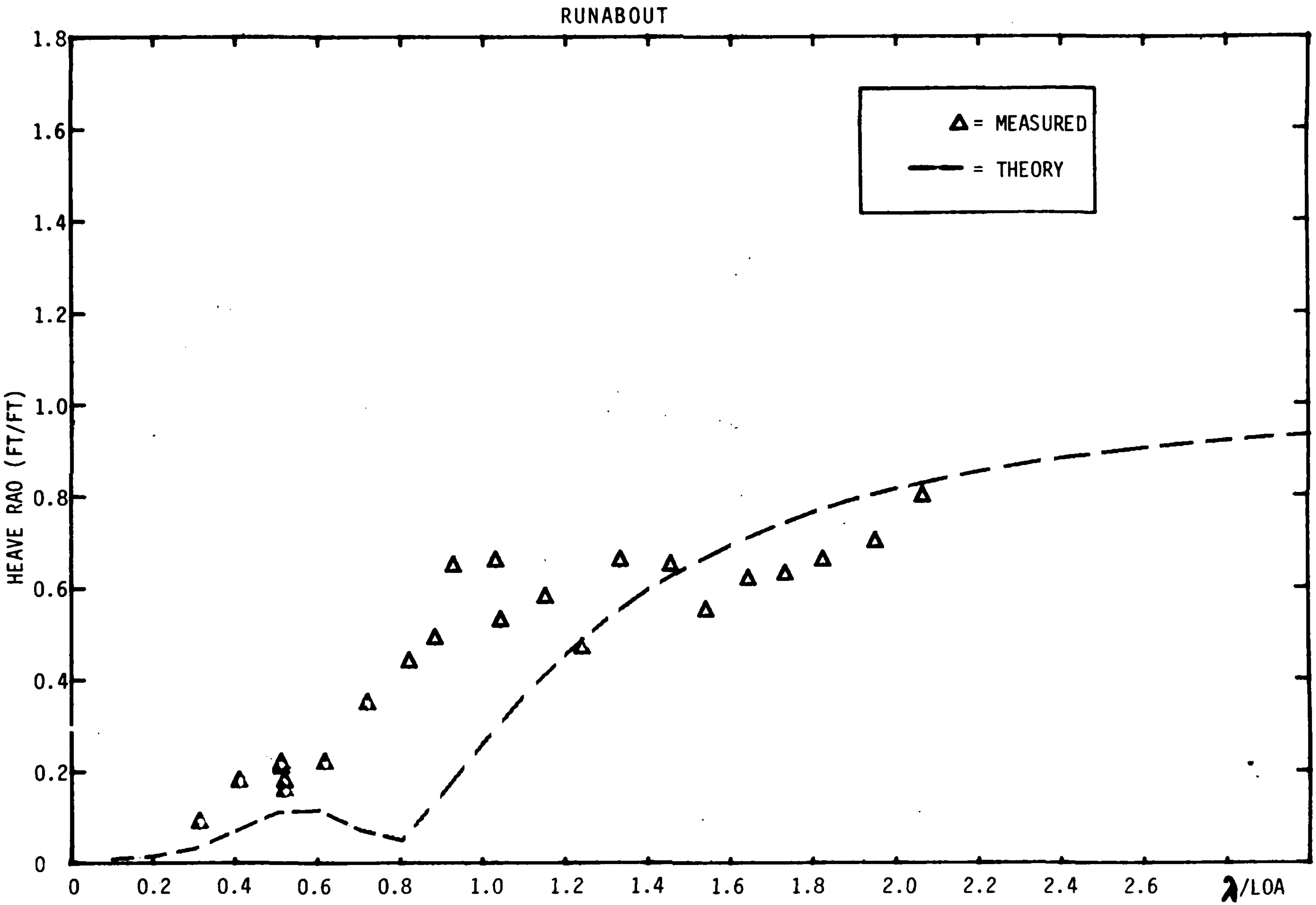

FIGURE 42b. HEAVE RAO, STERN WAVES, 3 MEN AFT and 2 MIDSHIP, TEST SERIES 2000

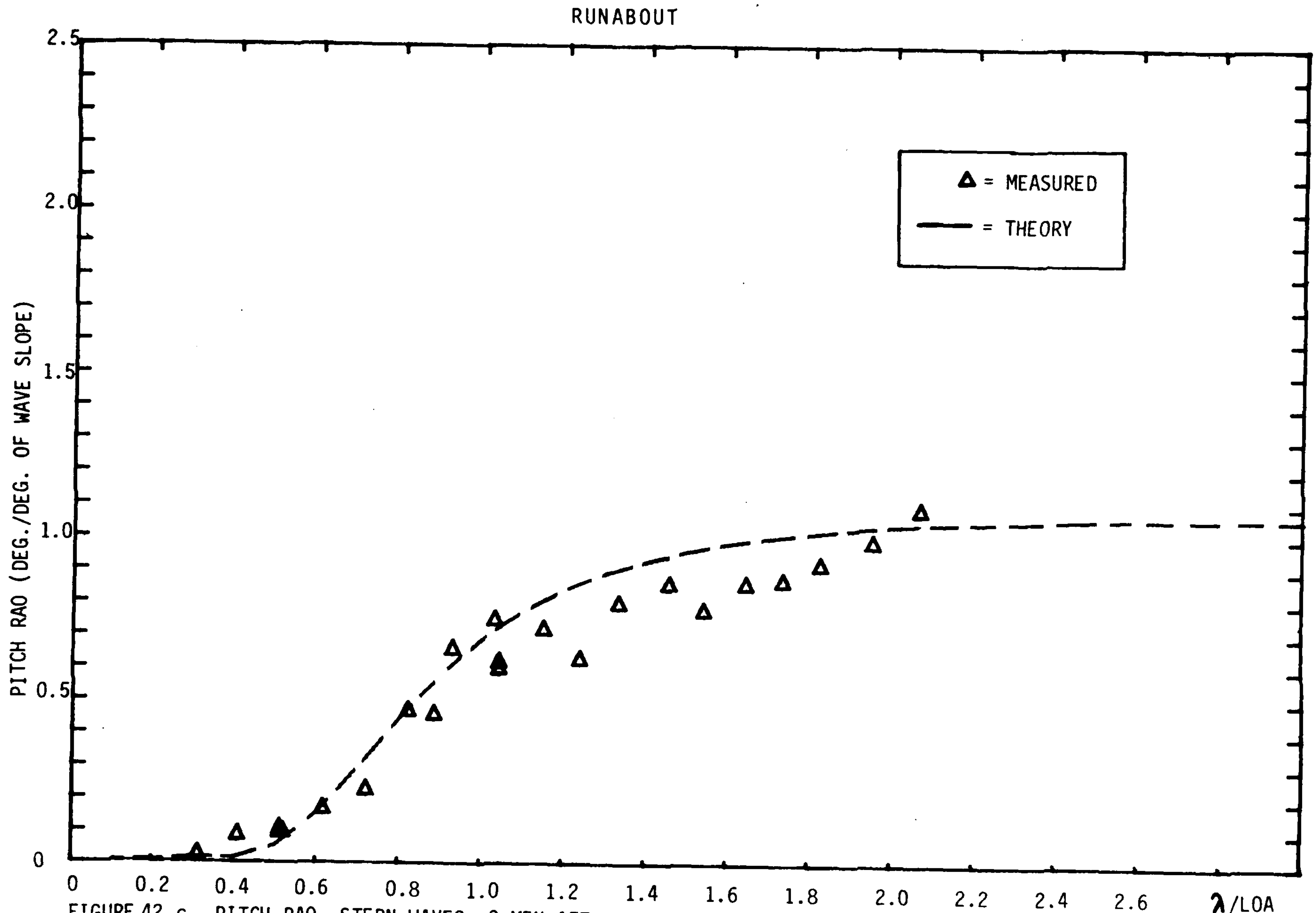

FIGURE 42 c. PITCH RAO, STERN WAVES, 3 MEN AFT and 2 MIDSHIP, TEST SERIES 2000

RUNABOUT

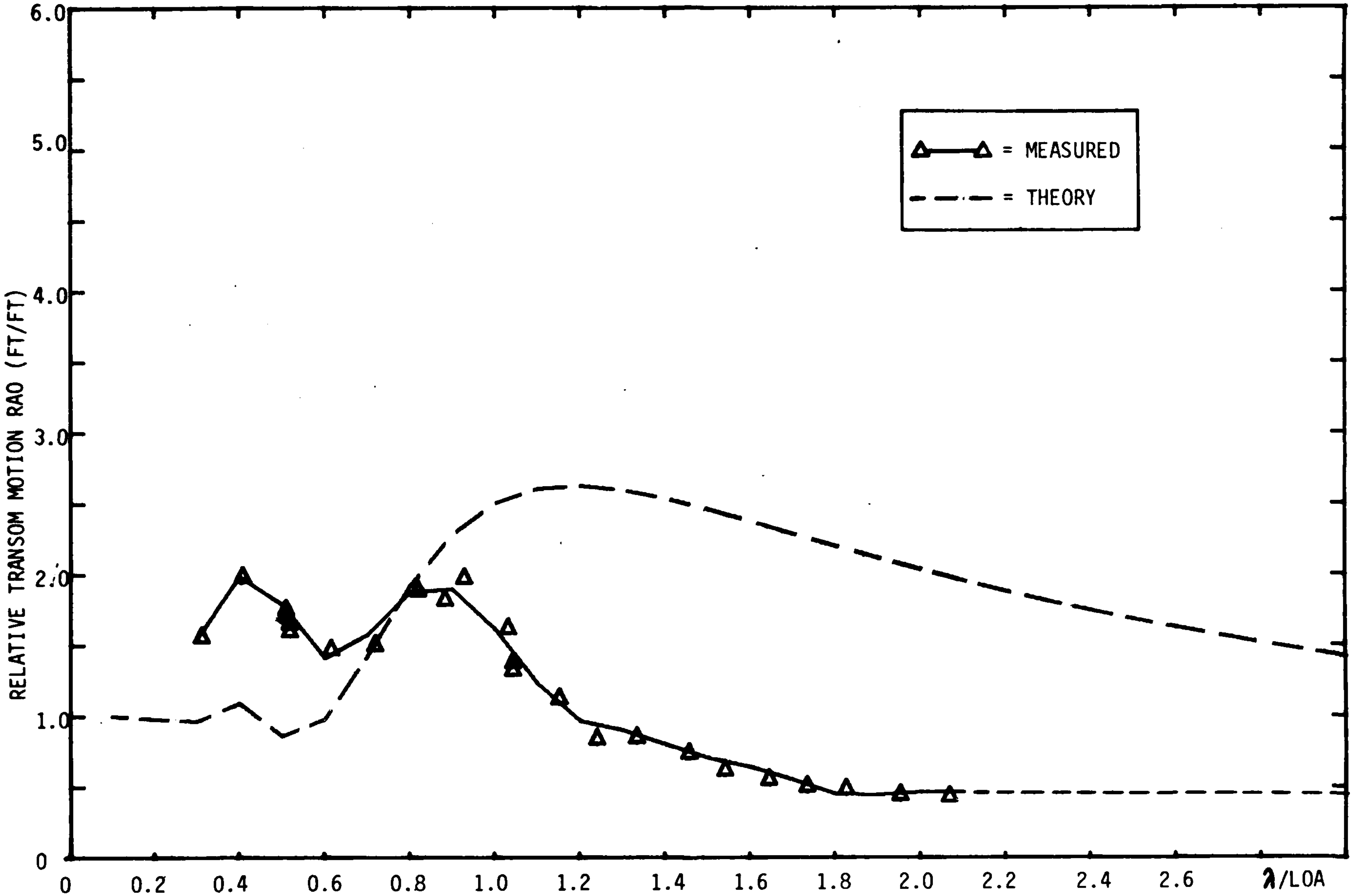

FIGURE 42 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 3 MEN AFT and 2 MIDSHIP, TEST SERIES 2 000

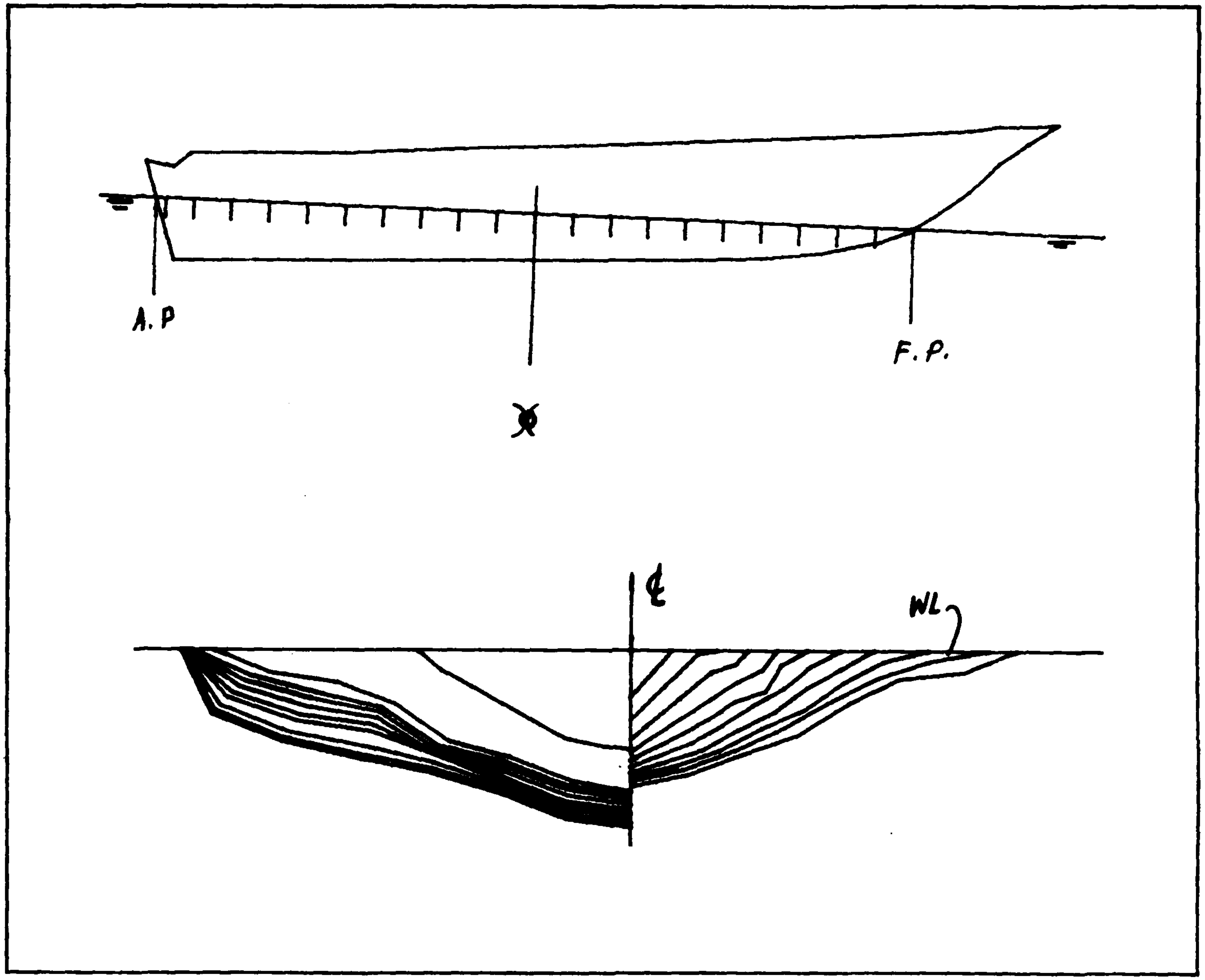

Figure 43a. UNDERBODY SHAPE OF RUNABOUT IN TEST SERIES 2100 (AS "SEEN" BY HANSEL)

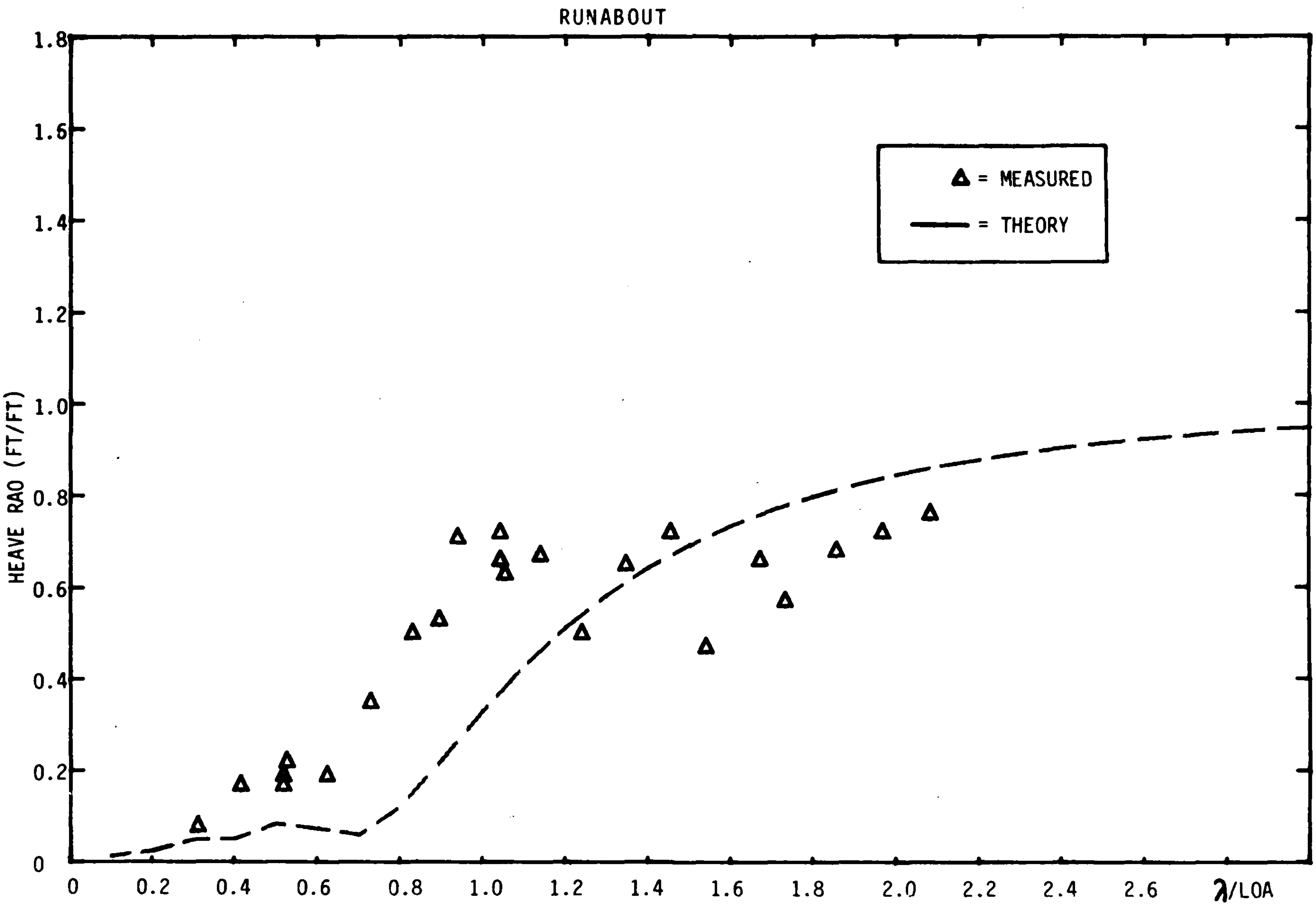

FIGURE 43 b. HEAVE RAO, STERN WAVES, 3 MEN AFT, TEST SERIES 2100

RUNABOUT

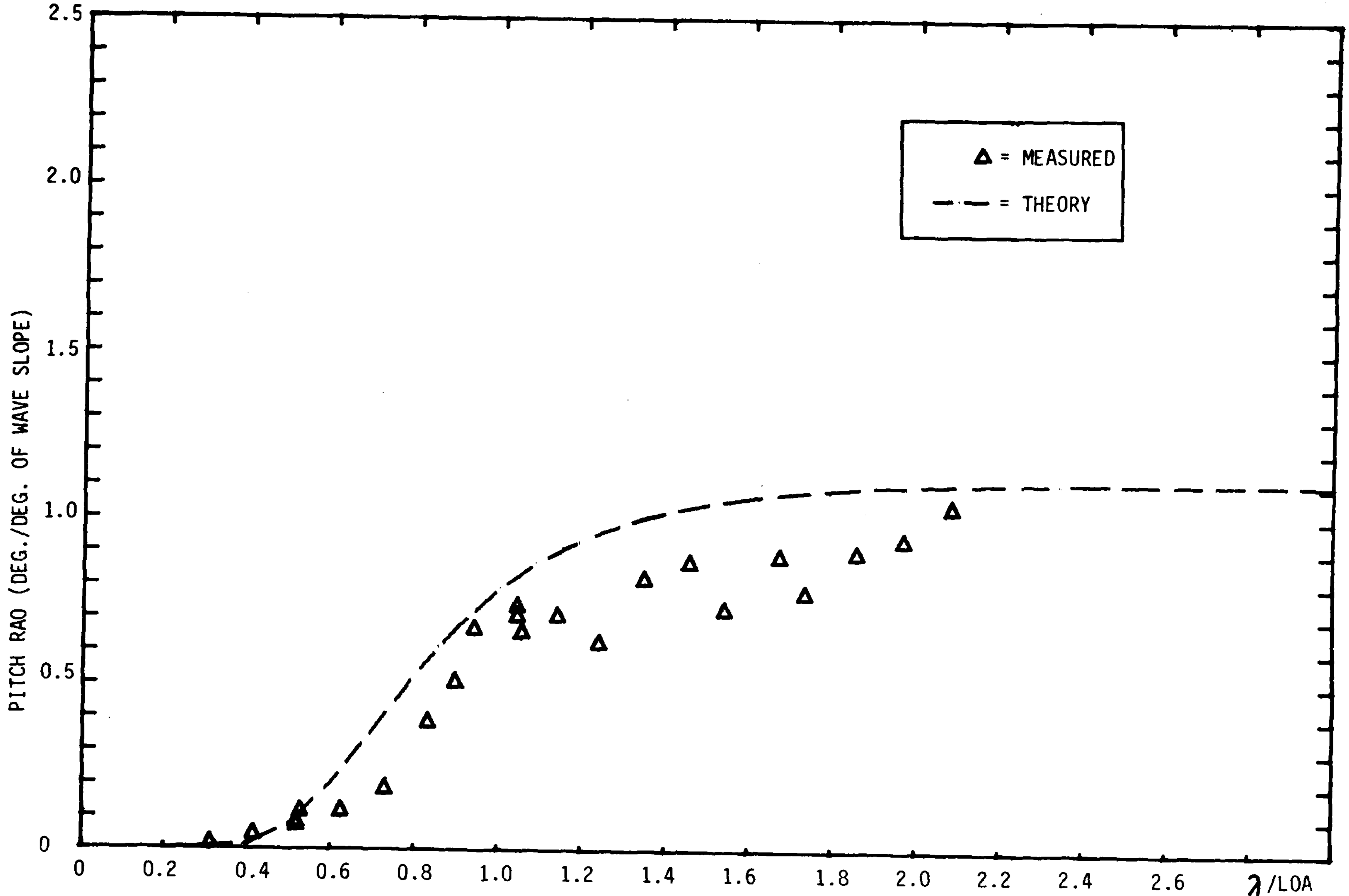

FIGURE 43 c. PITCH RAO, STERN WAVES, 3 MEN AFT, TEST SERIES 2100

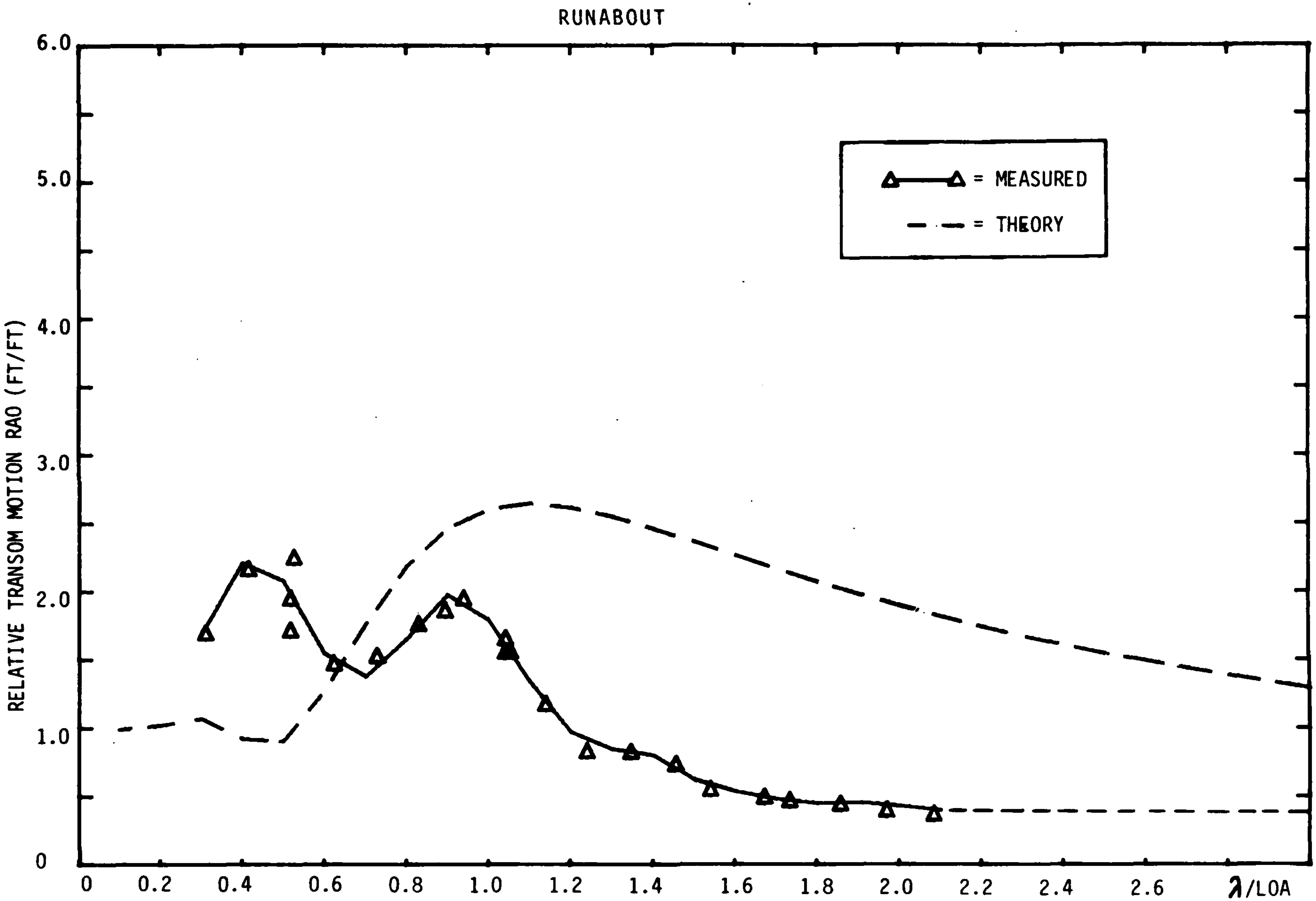

FIGURE 43 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 3 MEN AFT, TEST SERIES 2100

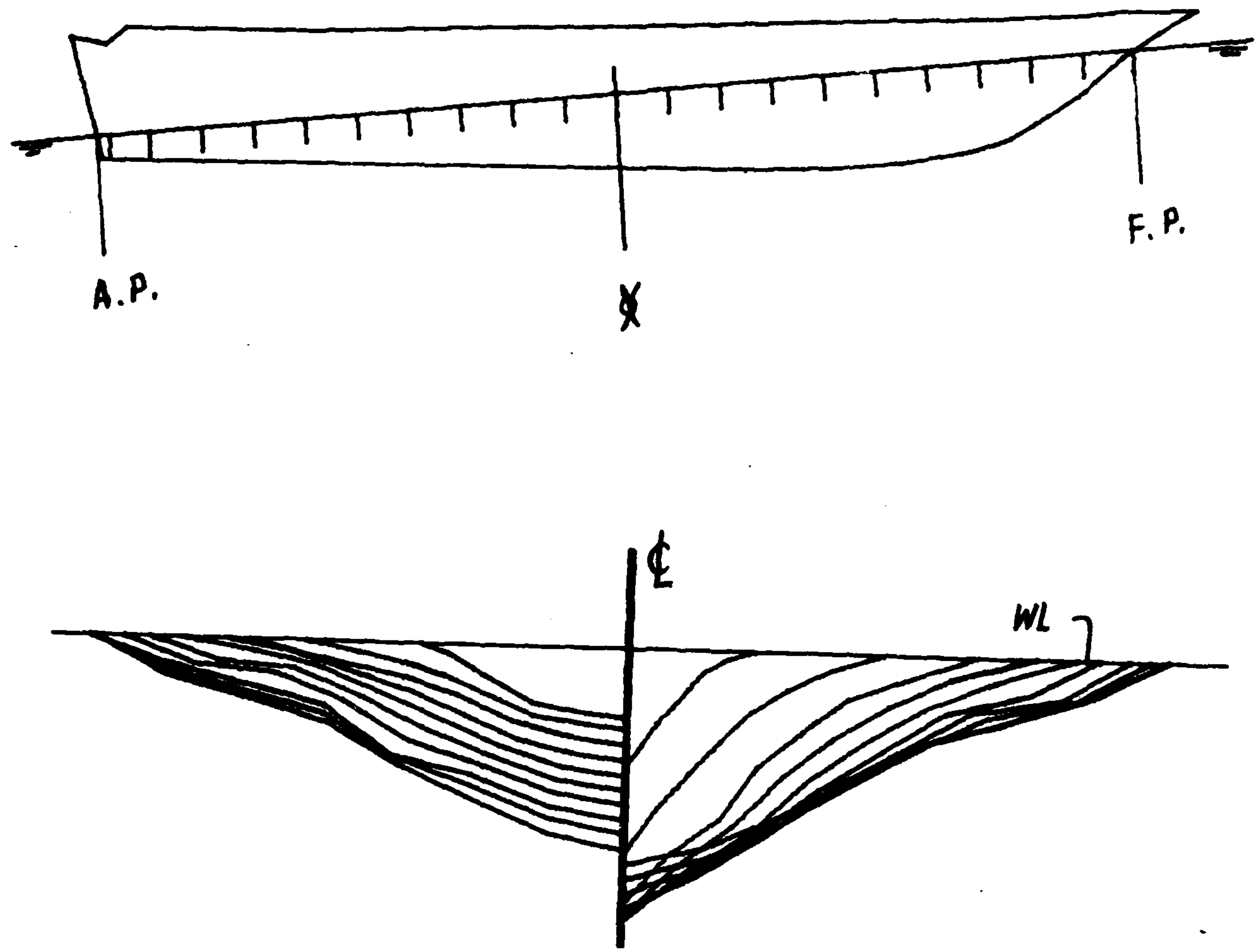

Figure 44a.UNDERBODY SHAPE OF RUNABOUT IN TEST SERIES 2200 (AS "SEEN" BY HANSEL)

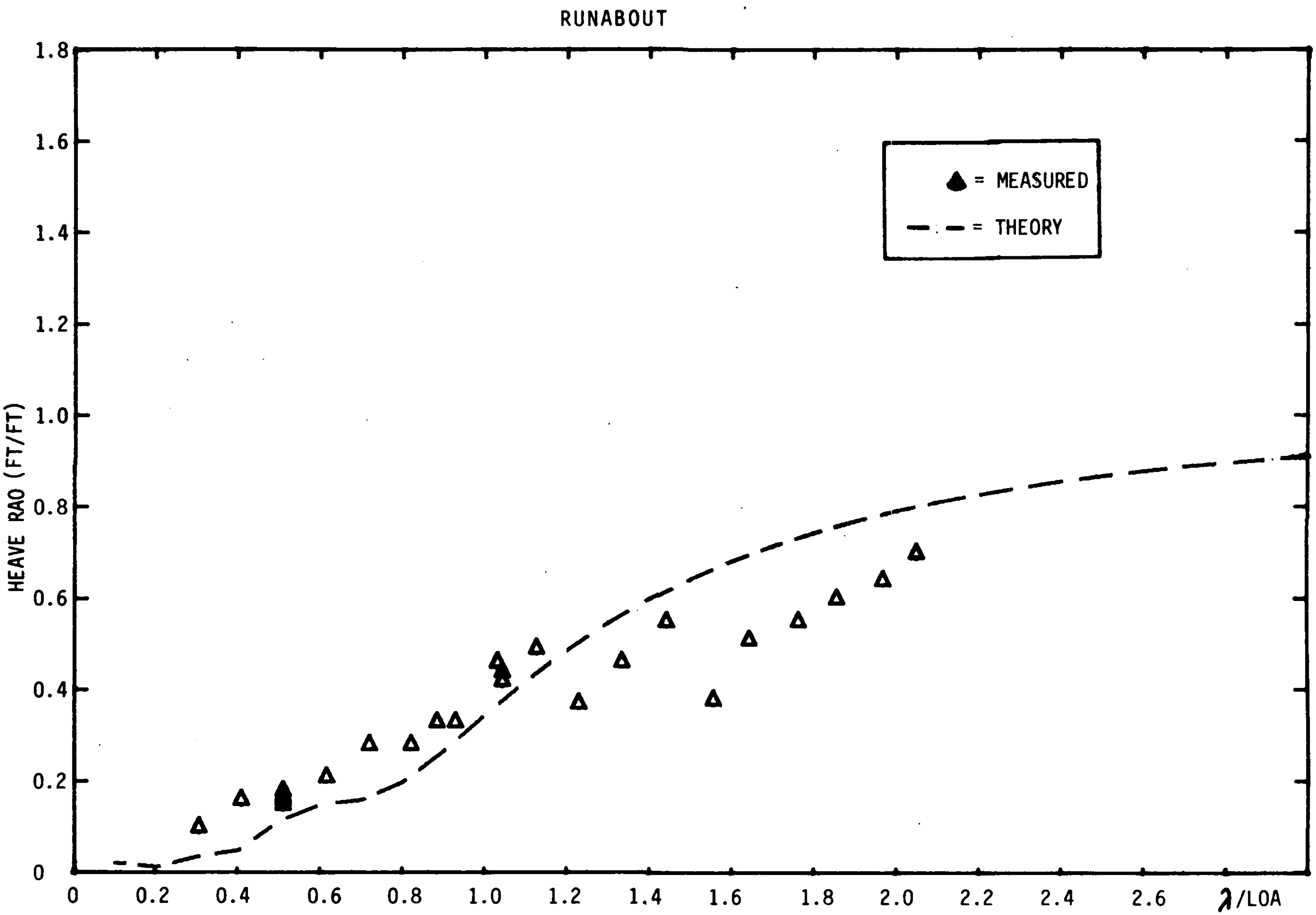

FIGURE 44 b. HEAVE RAO, BOW WAVES, 2 MEN FORWARD and 2 MEN MIDSHIP, TEST SERIES 2200

RUNABOUT

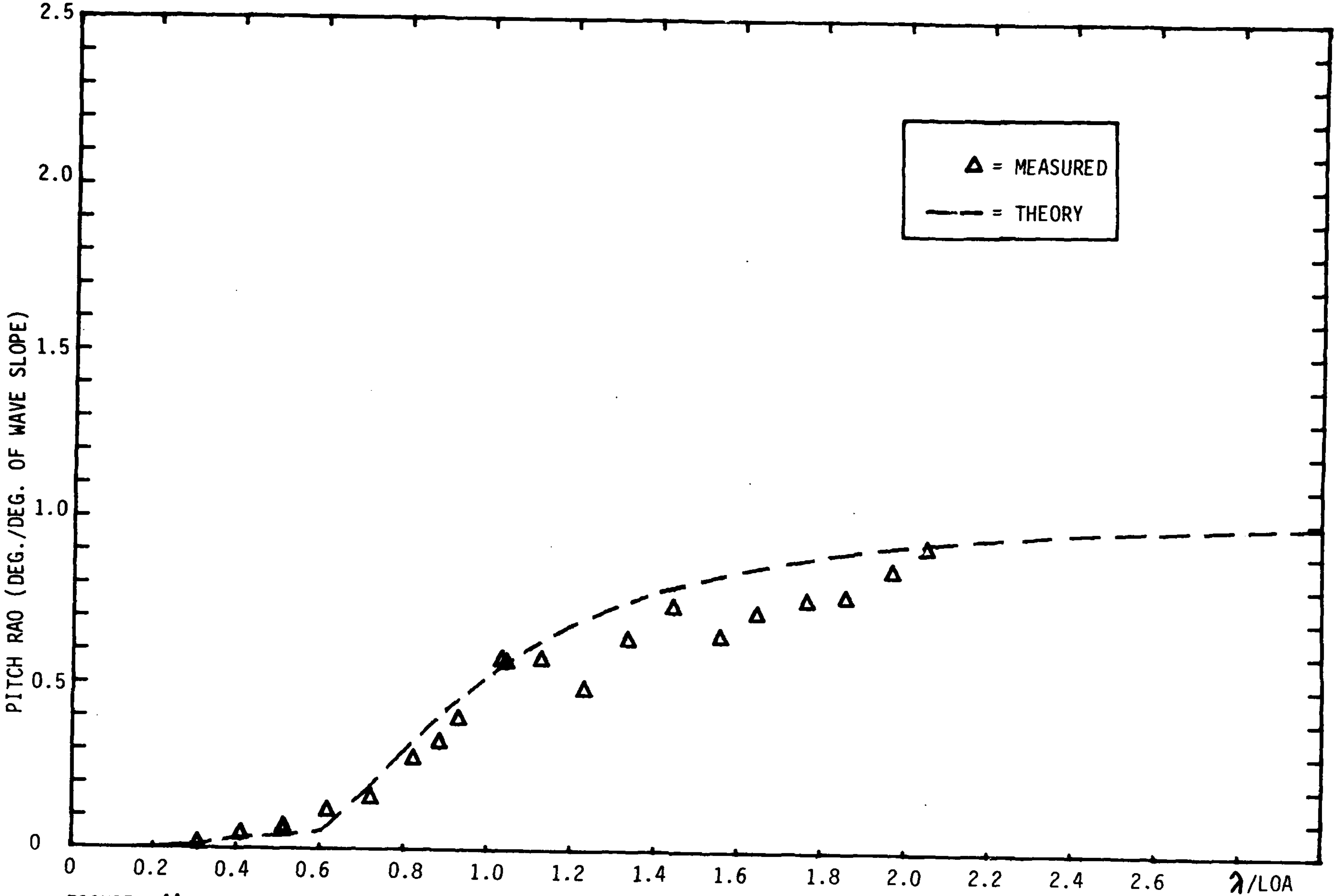

FIGURE 44 c.PITCH RAO, BOW WAVES, 2 MEN FORWARD and 2 MEN MIDSHIP, TEST SERIES 2200

RUNABOUT

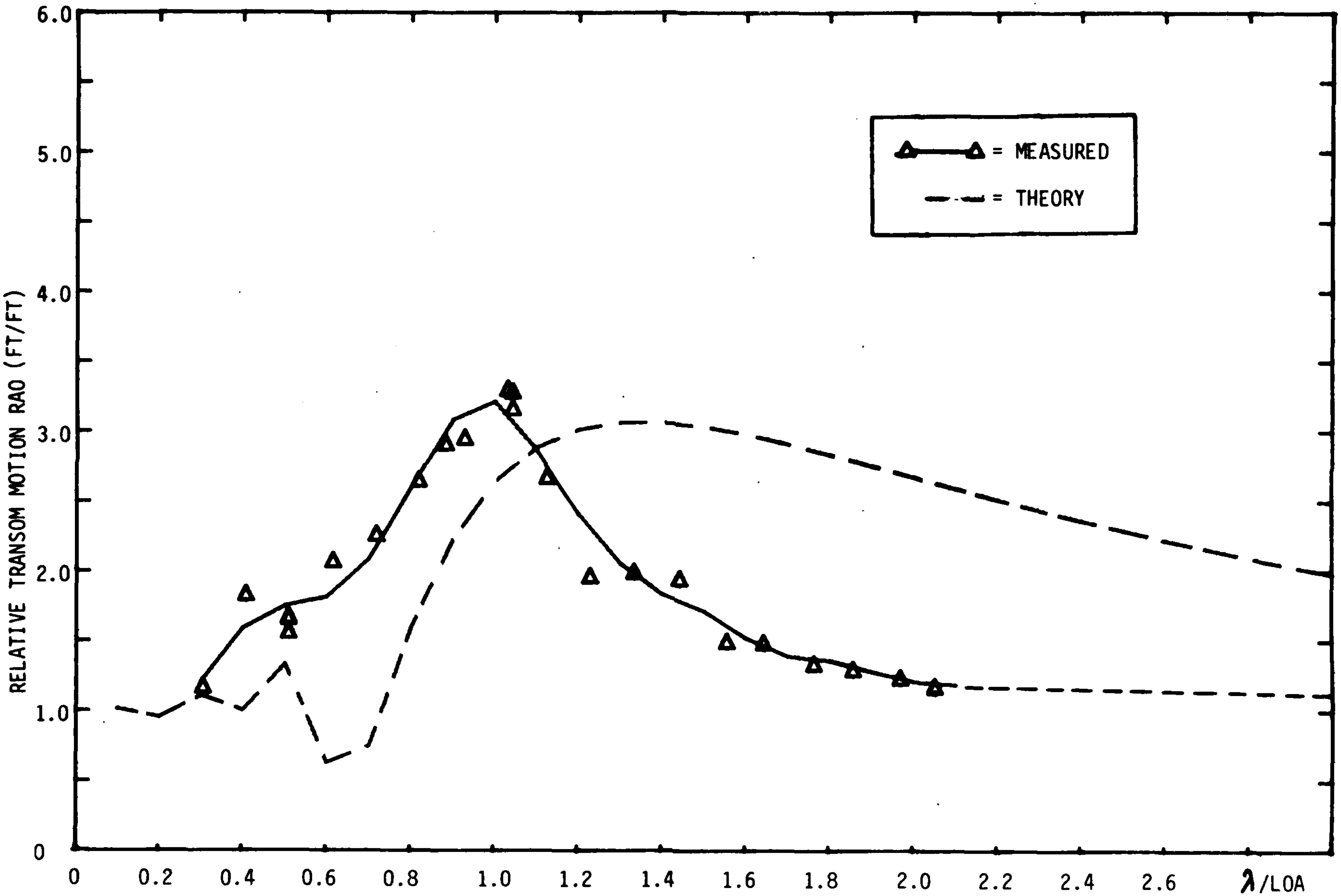

FIGURE 44 d. TRANSOM RELATIVE MOTION RAO, BOW WAVES, 2 MEN FORWARD and 2 MEN MIDSHIP, TEST SERIES 2 200

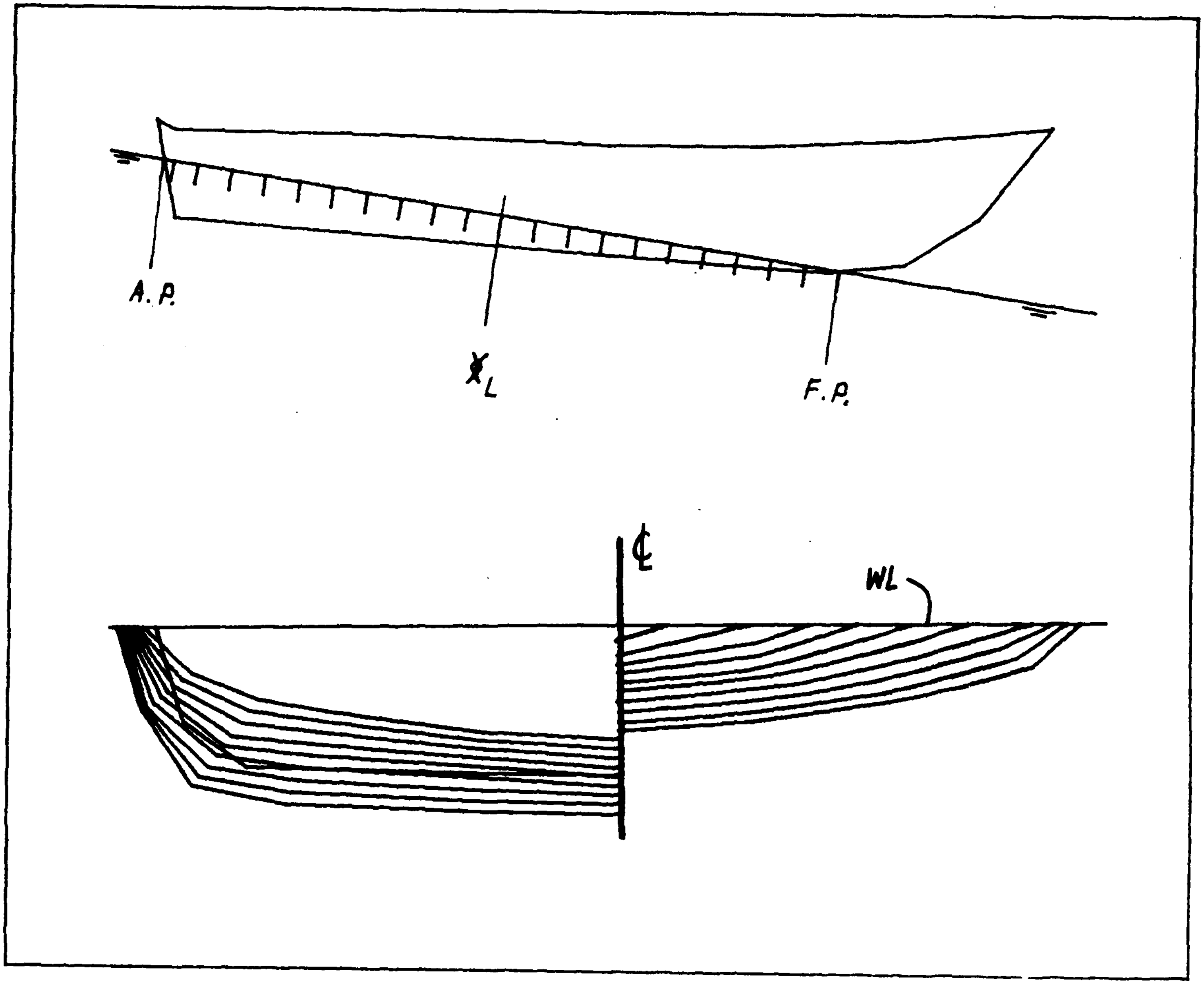

Figure 45a. UNDERBODY SHAPE OF SKIFF IN TEST SERIES 2300 (AS "SEEN" BY HANSEL)

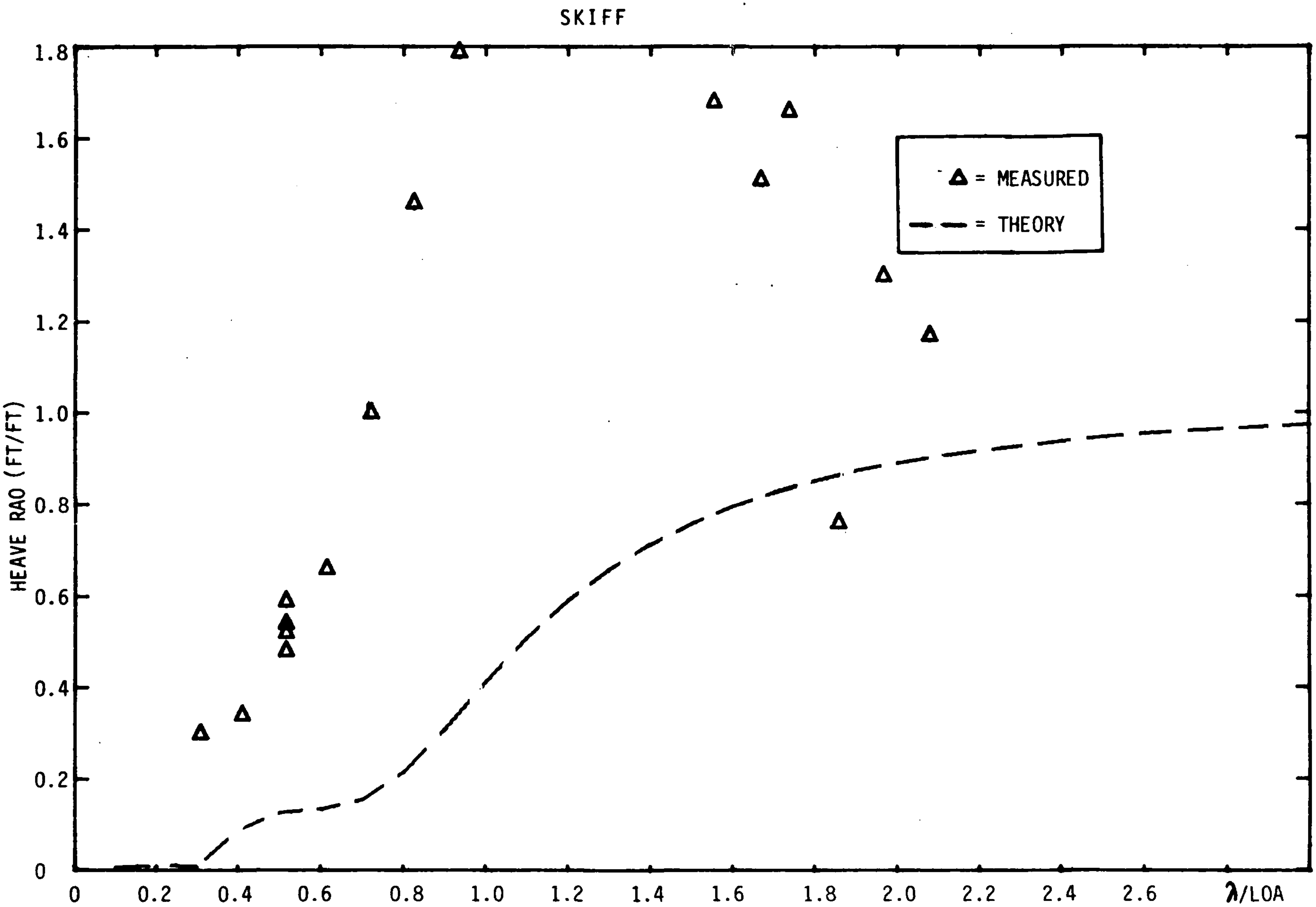

FIGURE 45 b. HEAVE RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 2300

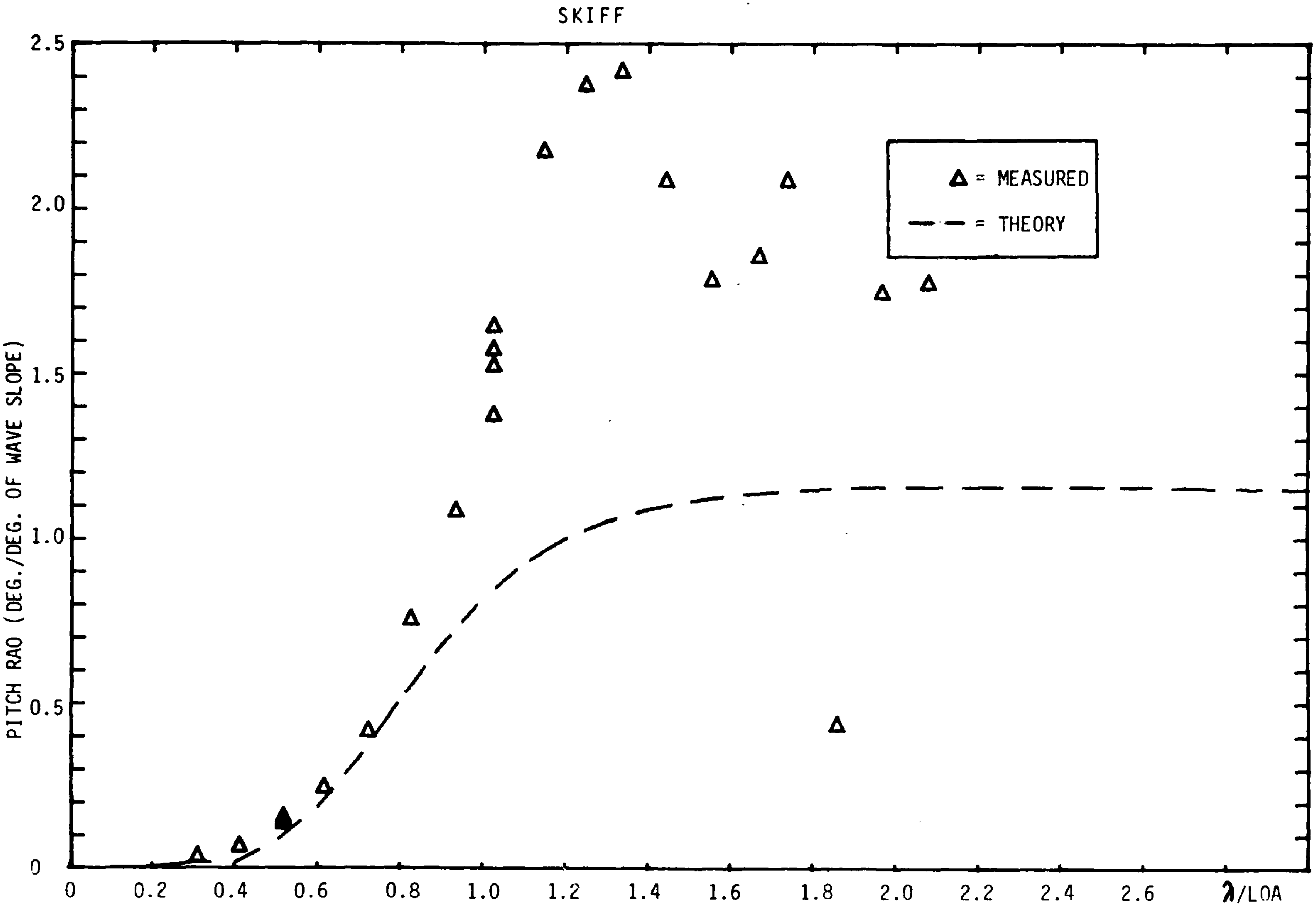

FIGURE 45 c. PITCH RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 2300

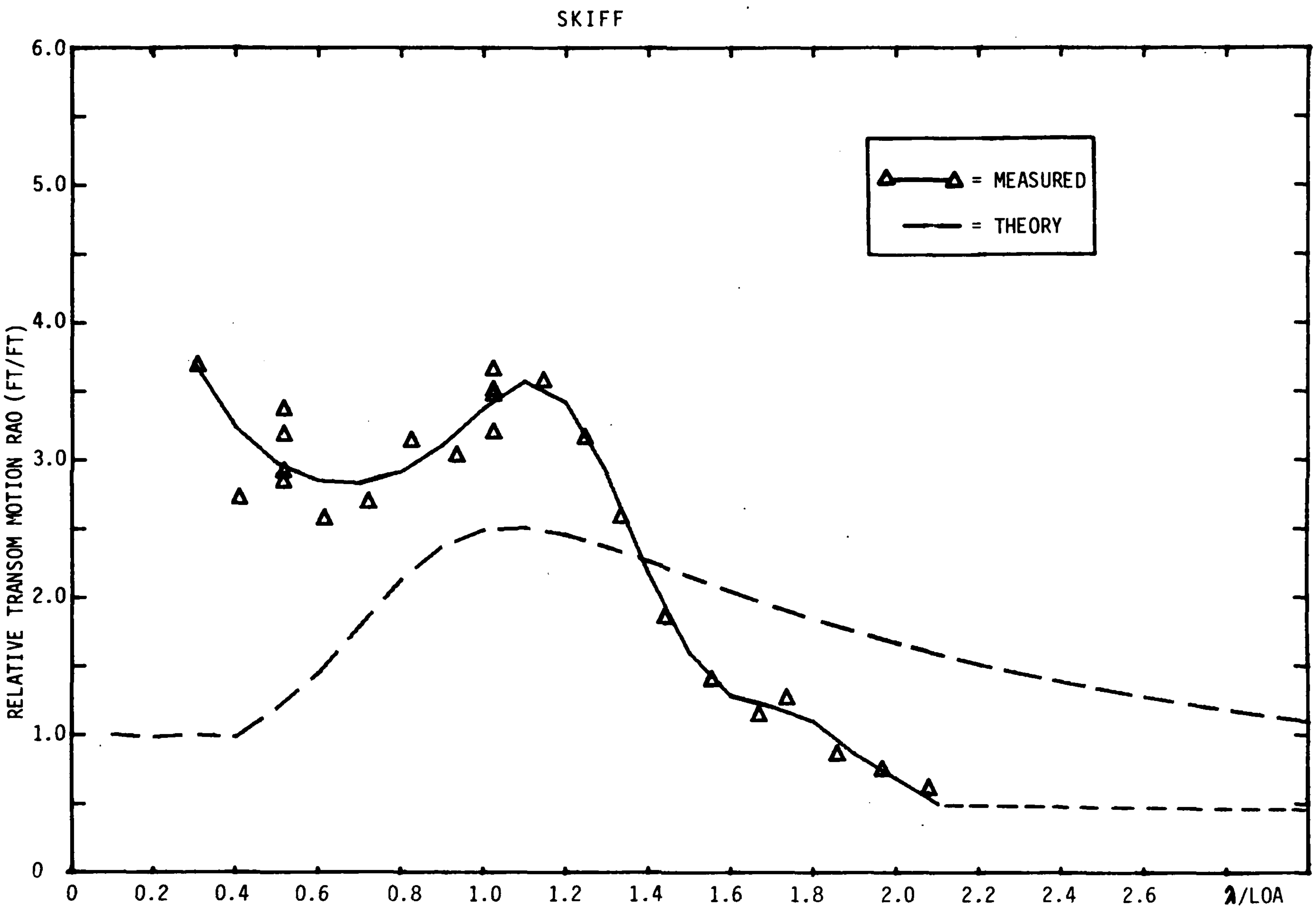

FIGURE 45 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 2 MEN AFT and 1 MAN MIDSHIP, TEST SERIES 2300

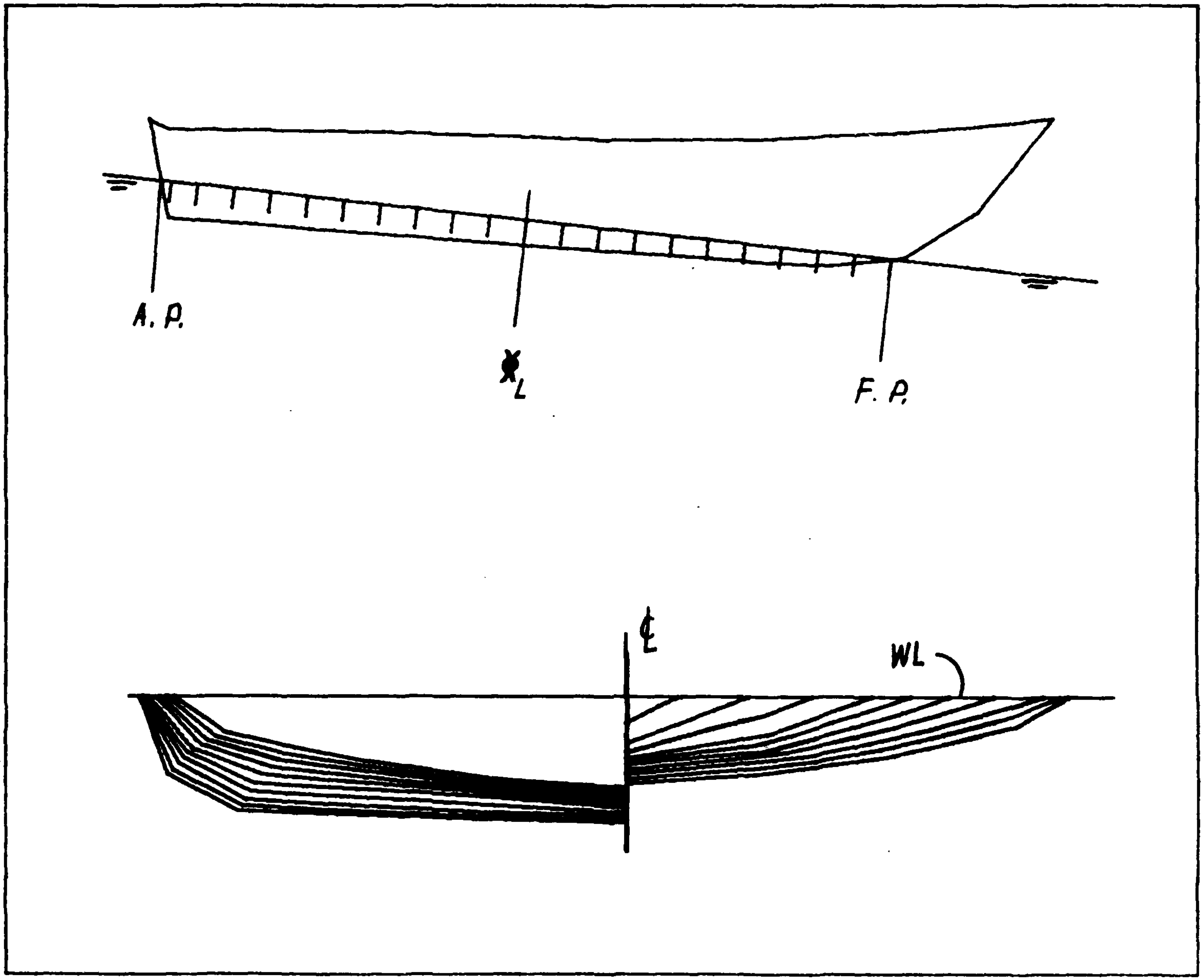

Figure 46a.UNDERBODY SHAPE OF SKIFF IN TEST SERIES 2400 (AS "SEEN" BY HANSEL)

SKIFF

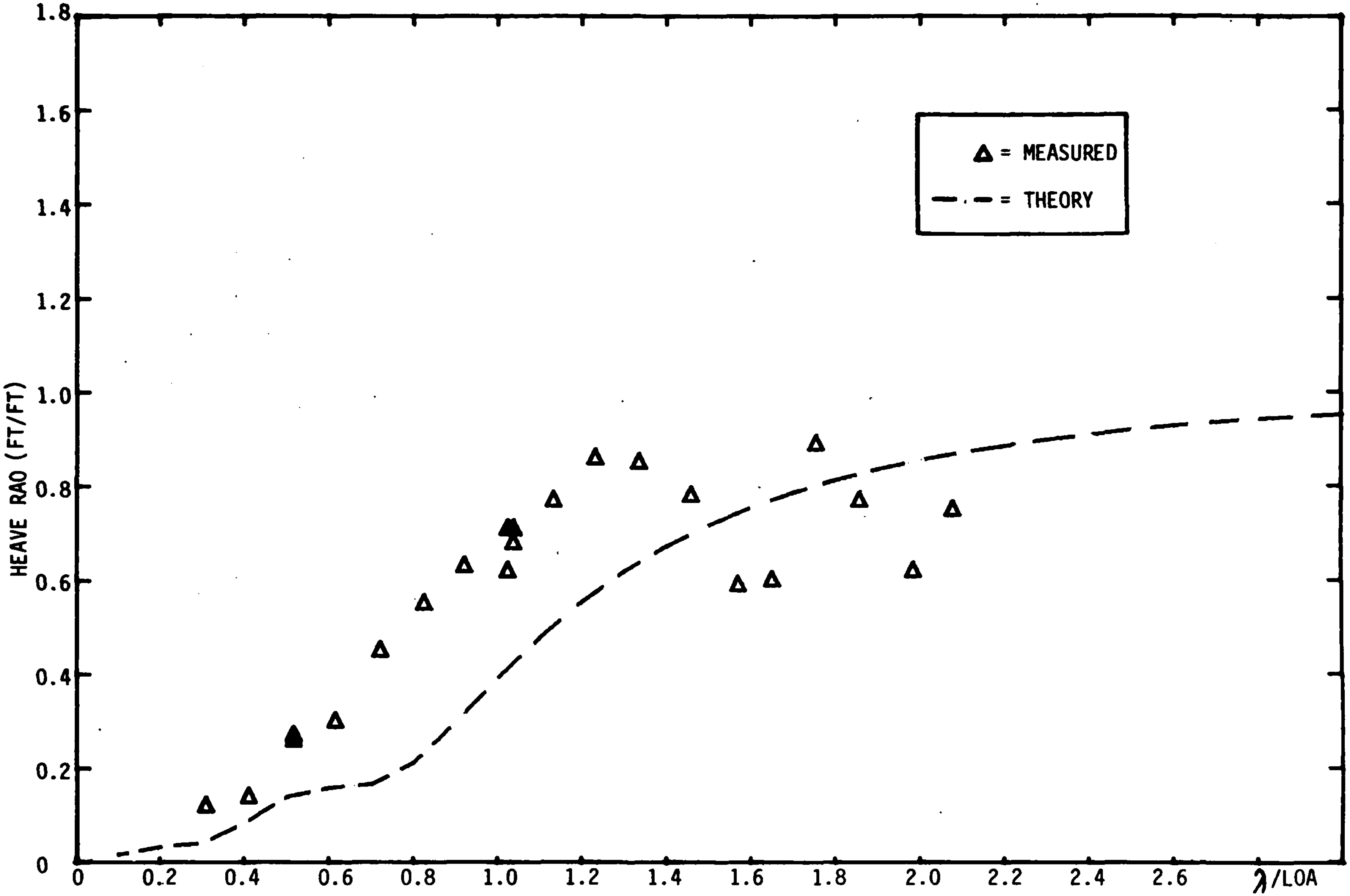

FIGURE 46 b. HEAVE RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2400

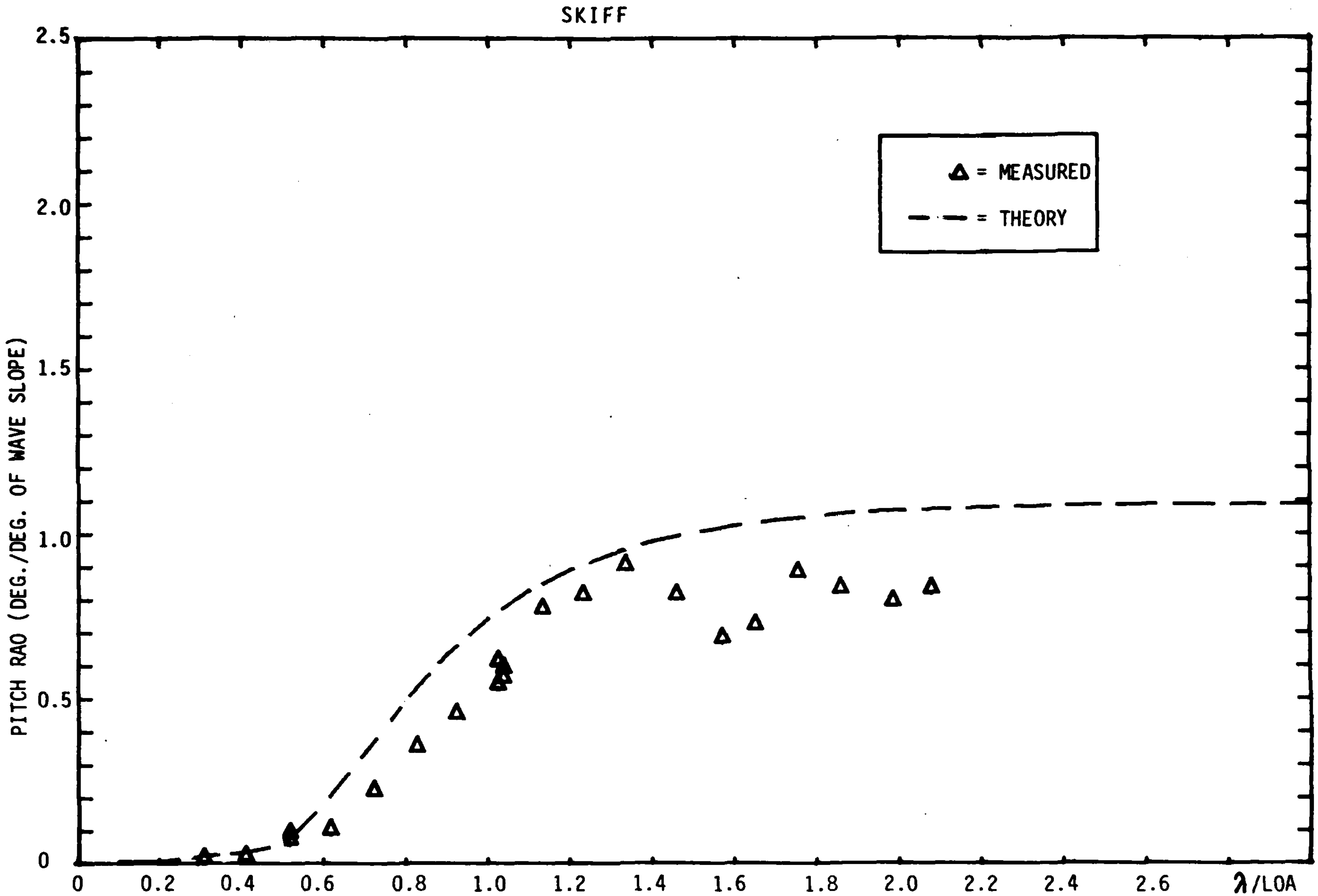

FIGURE 46 c. PITCH RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2400

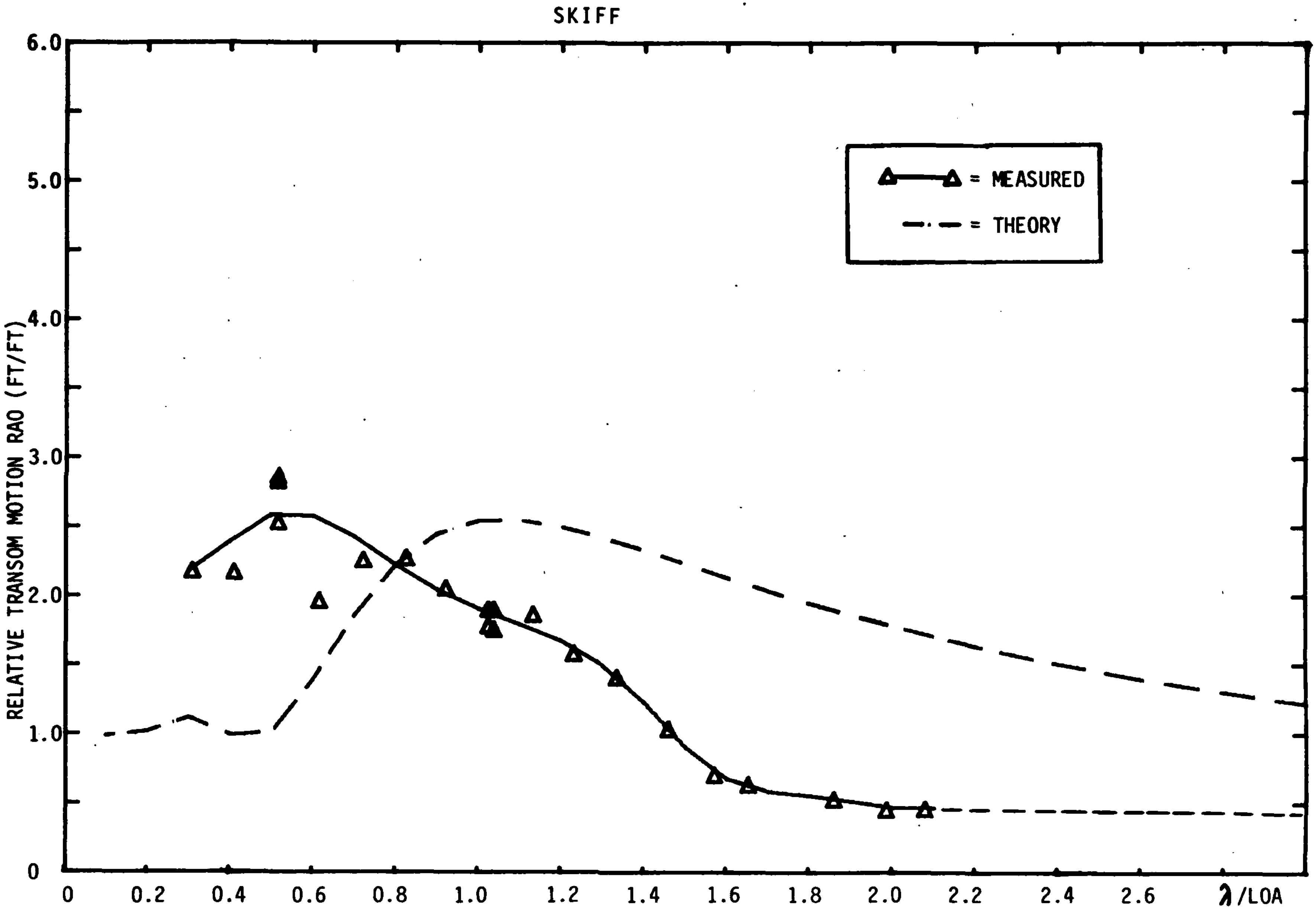

FIGURE 46 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2400

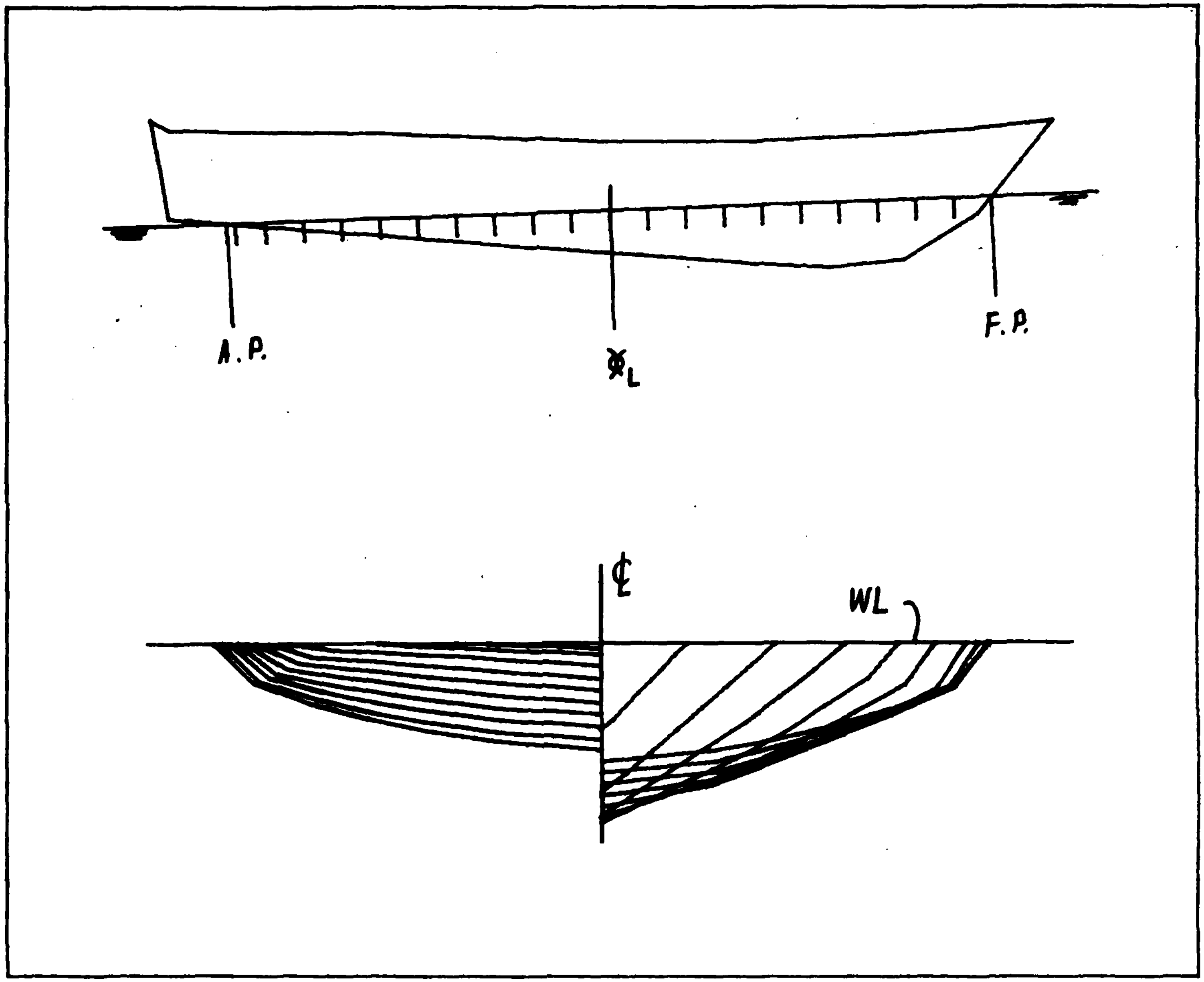

Figure 47a. UNDERBODY SHAPE OF SKIFF IN TEST SERIES 2500 (AS "SEEN" BY HANSEL)

SKIFF

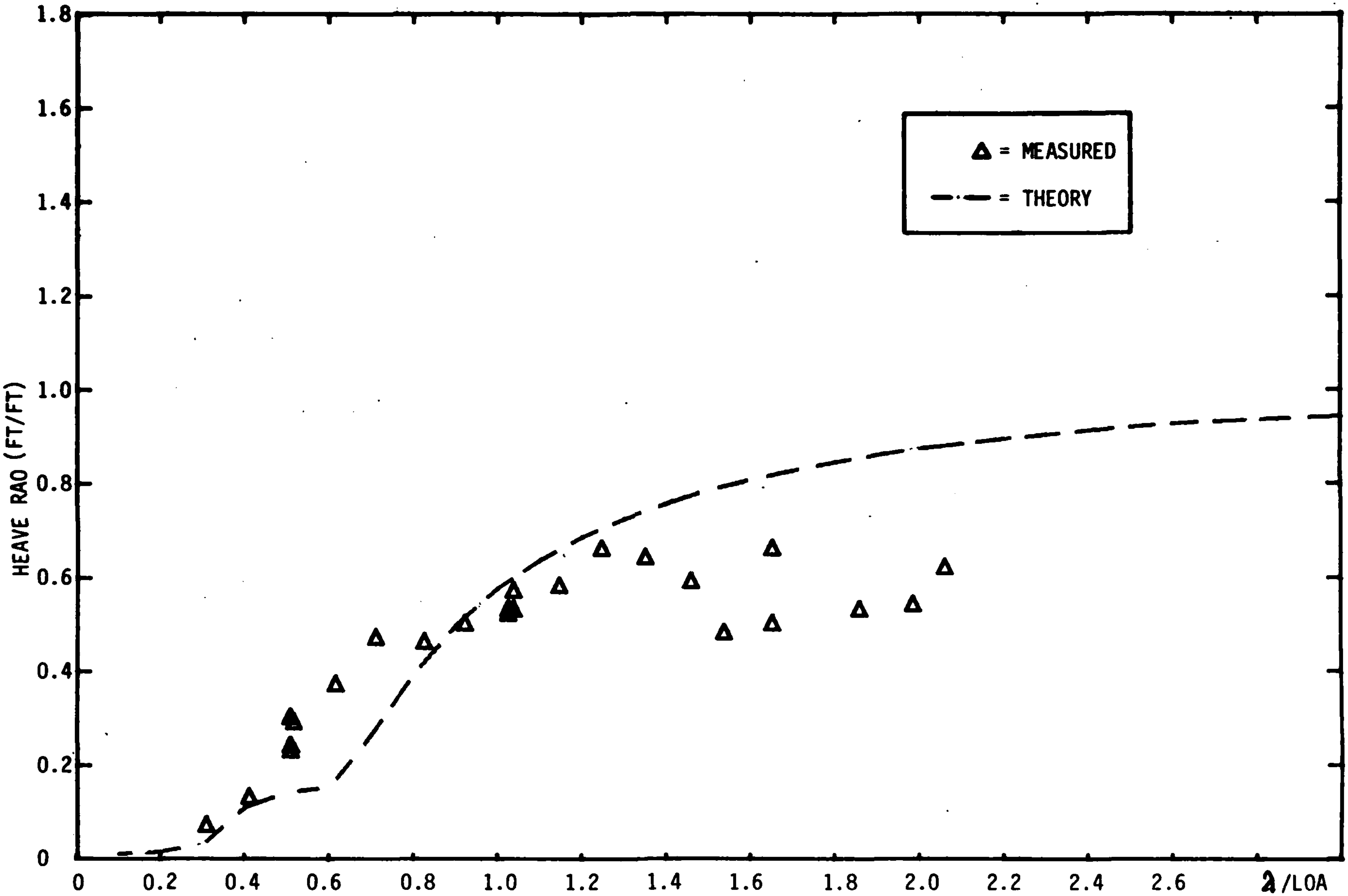

FIGURE 47 b. HEAVE RAO, BOW WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP, TEST SERIES 2500

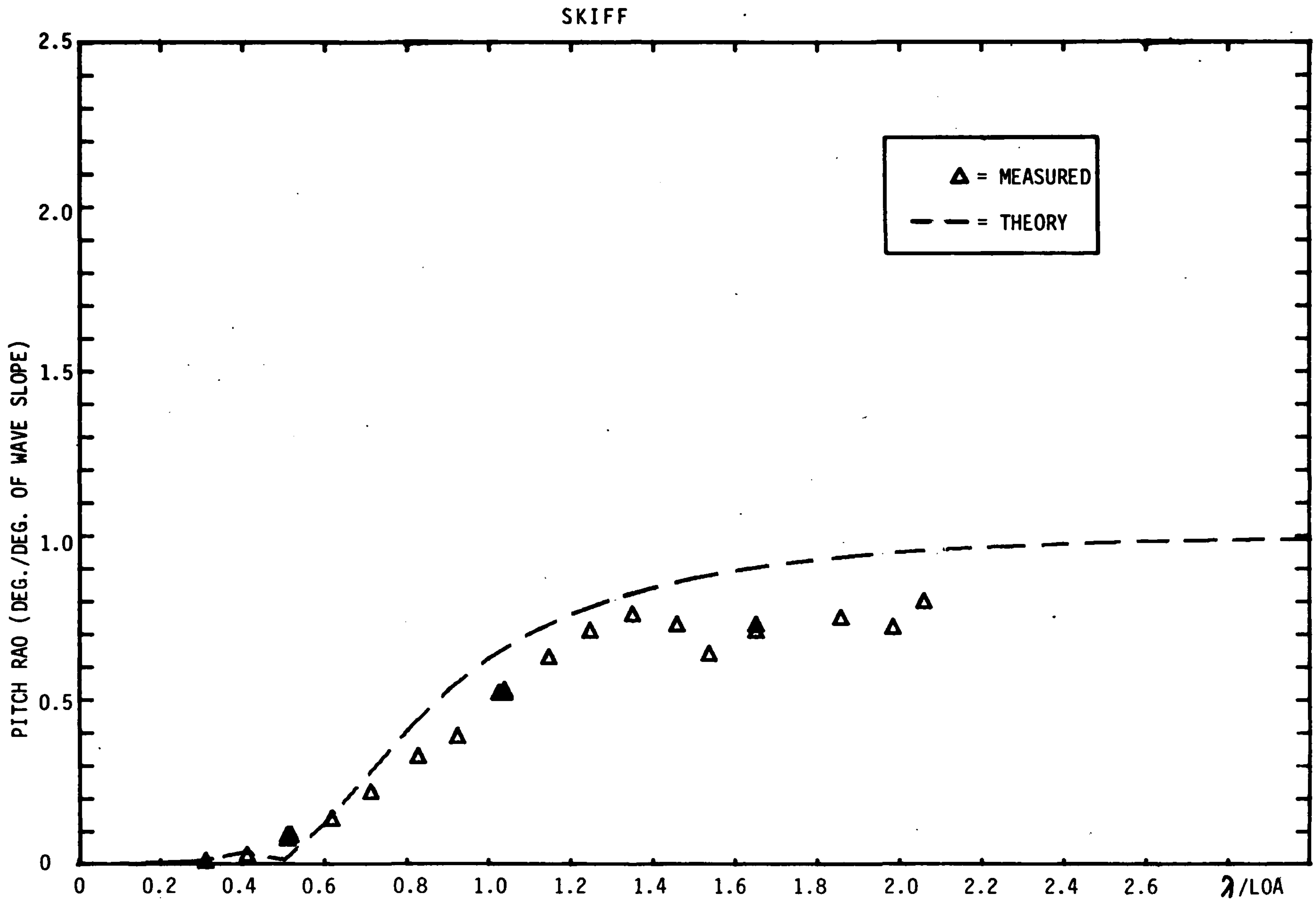

FIGURE 47 c. PITCH RAO, BOW WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP, TEST SERIES 2500

SKIFF

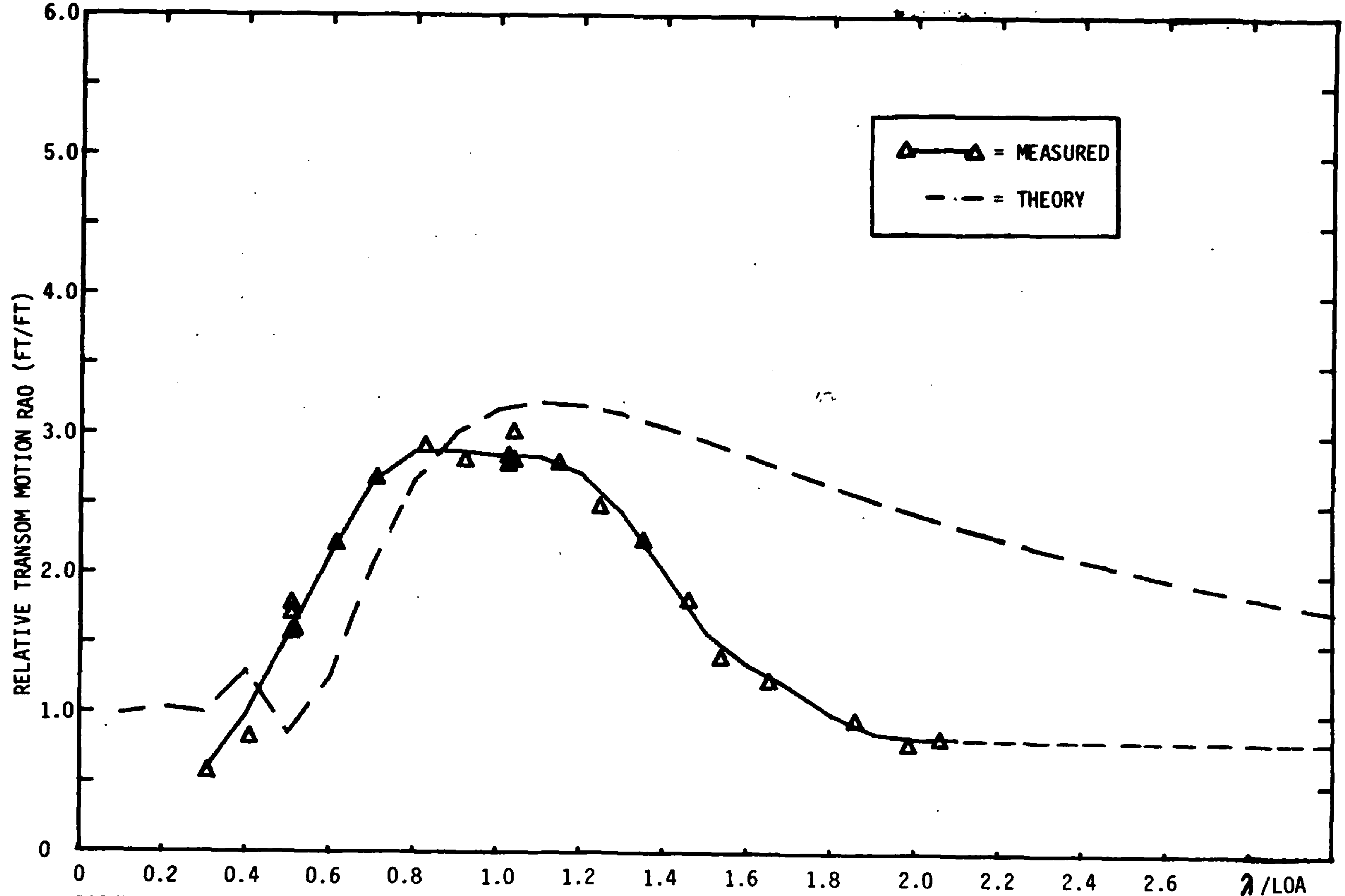

FIGURE 47 d. TRANSOM RELATIVE MOTION RAO, BOW WAVES, 2 MEN FORWARD and 1 MAN MIDSHIP, TEST SERIES 2 500

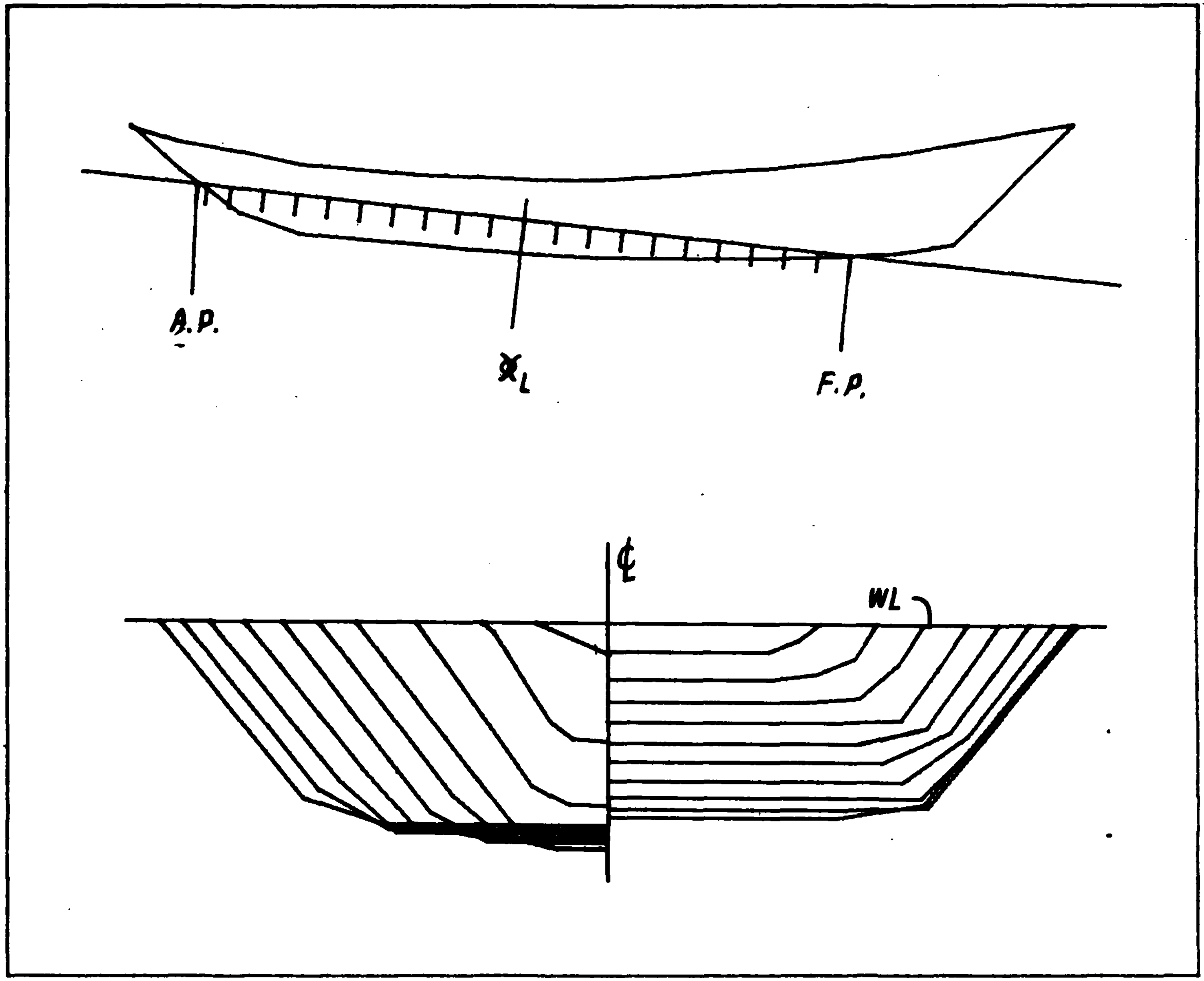

Figure 48a. UNDERBODY SHAPE OF DORY IN TEST SERIES 2600 (AS "SEEN" BY HANSEL)

DORY

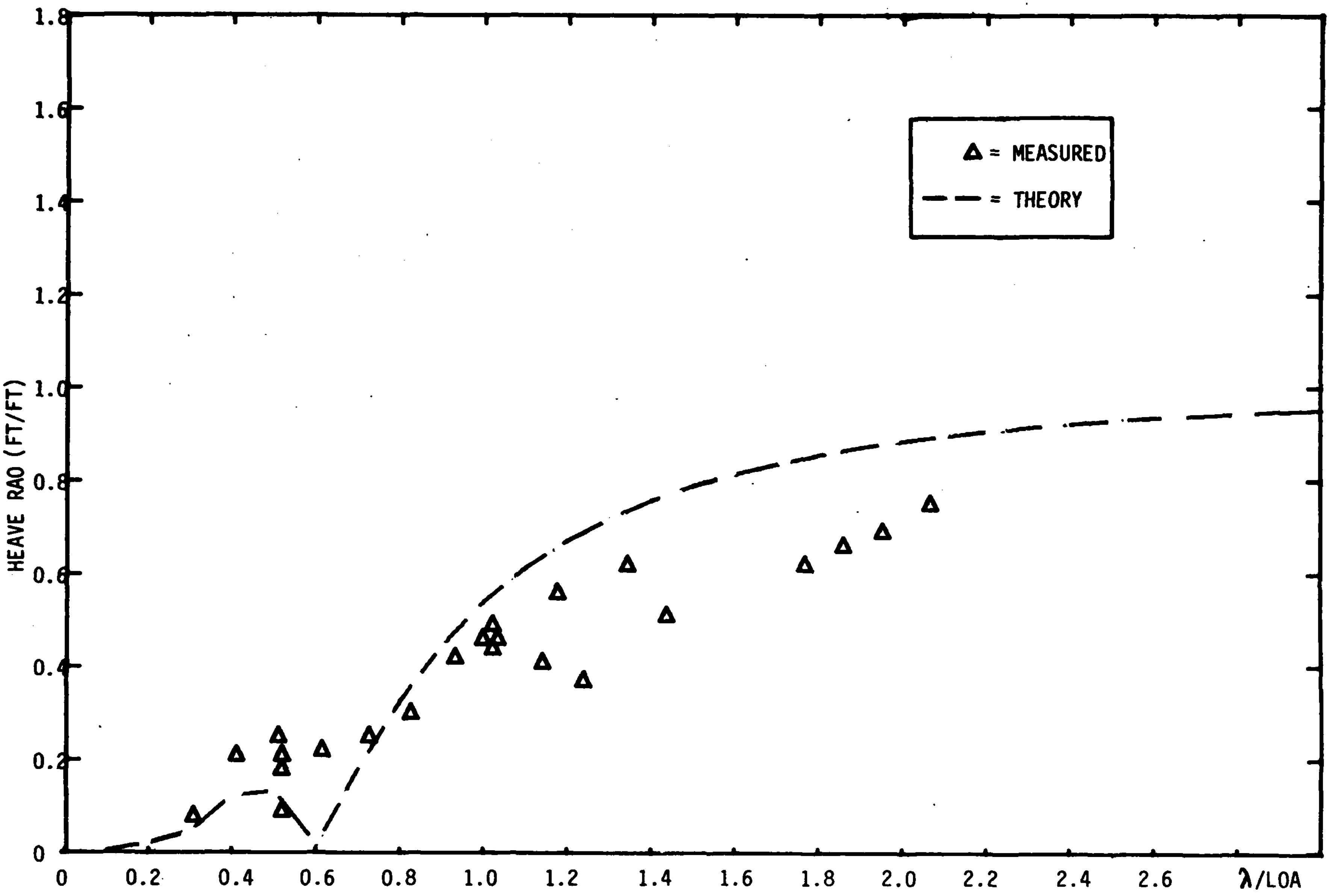

FIGURE 48 b. HEAVE RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2600

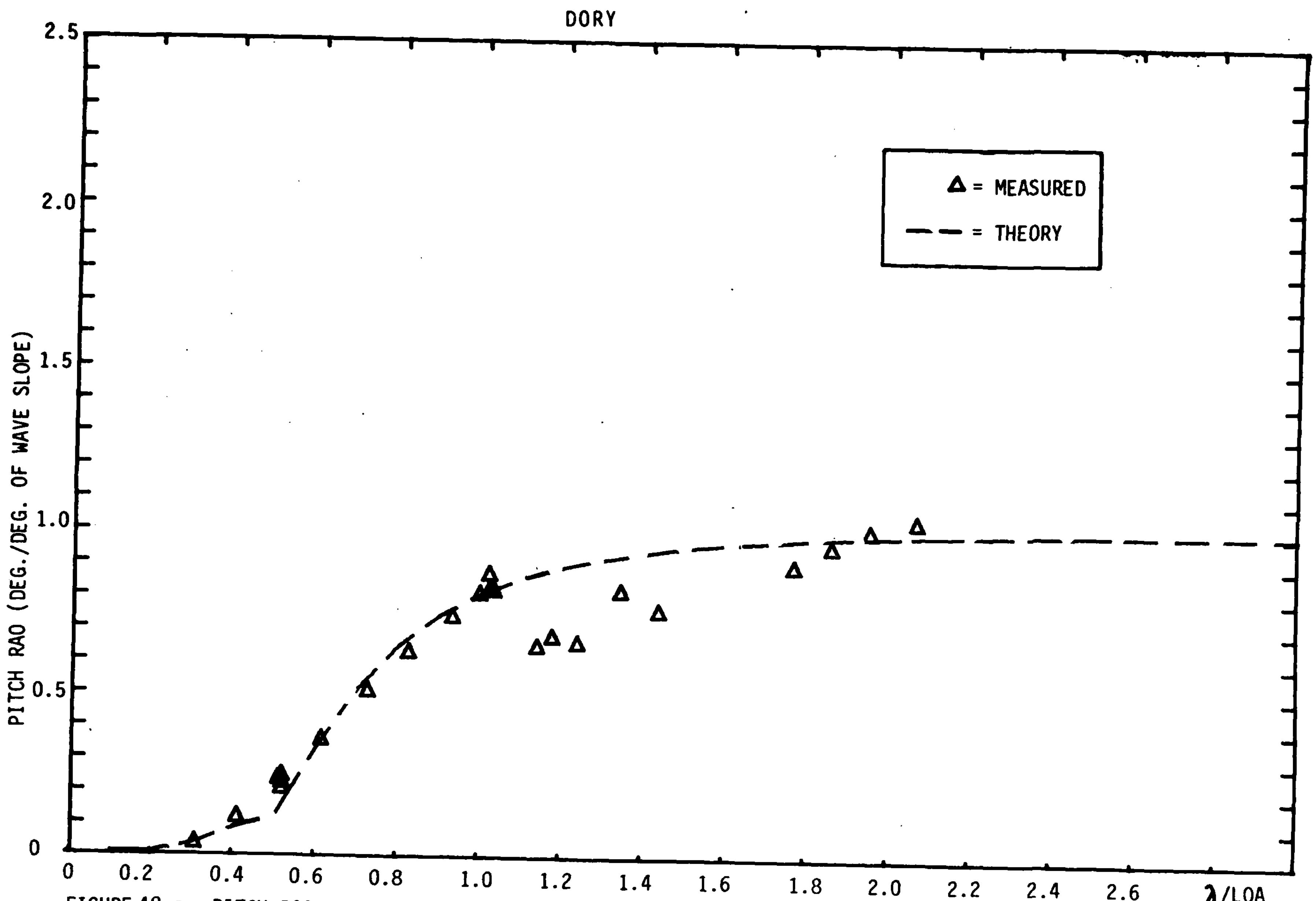

FIGURE 48 c. PITCH RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2600

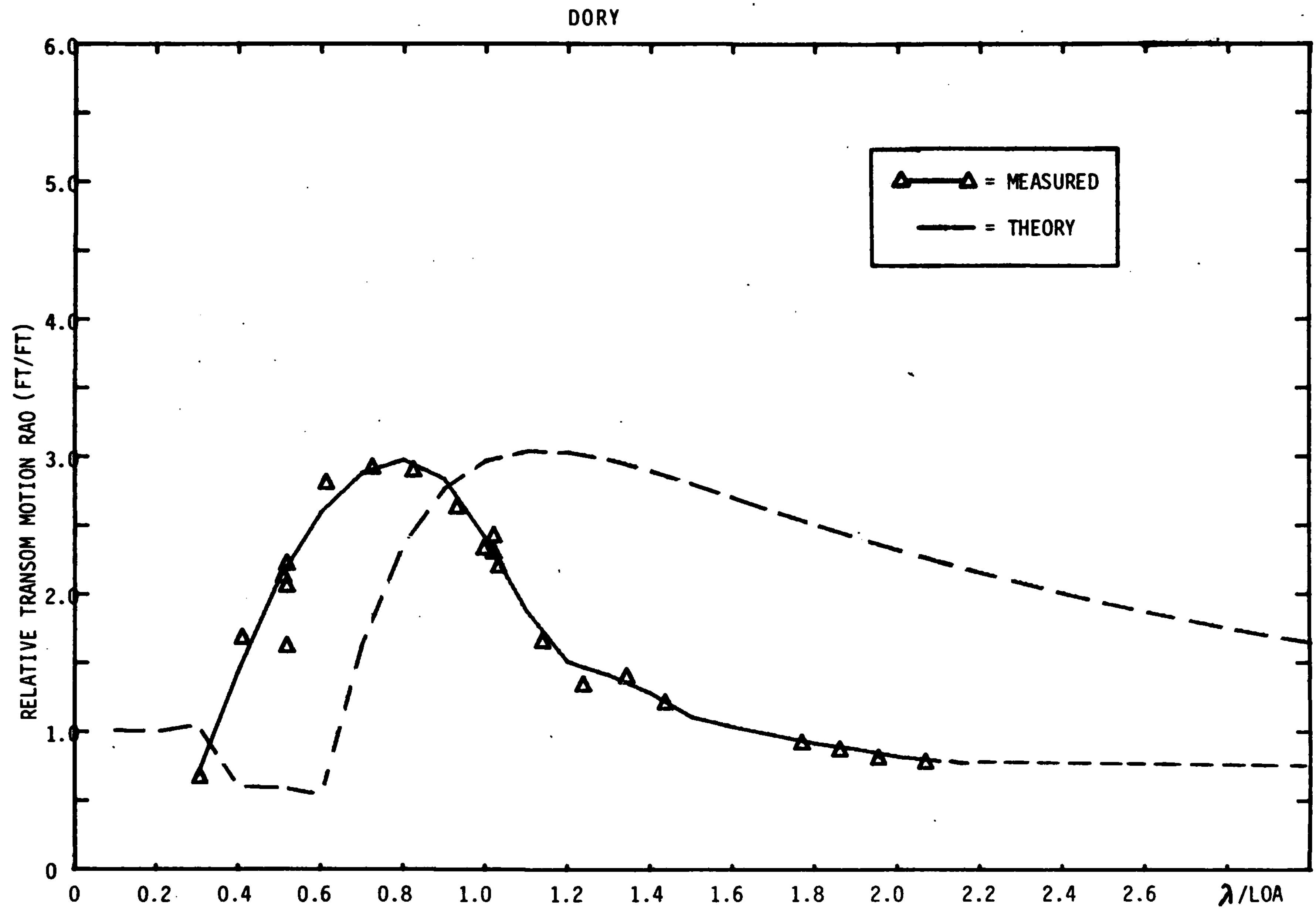

FIGURE 48 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 1 MAN AFT and 1 MAN MIDSHIP, TEST SERIES 2600

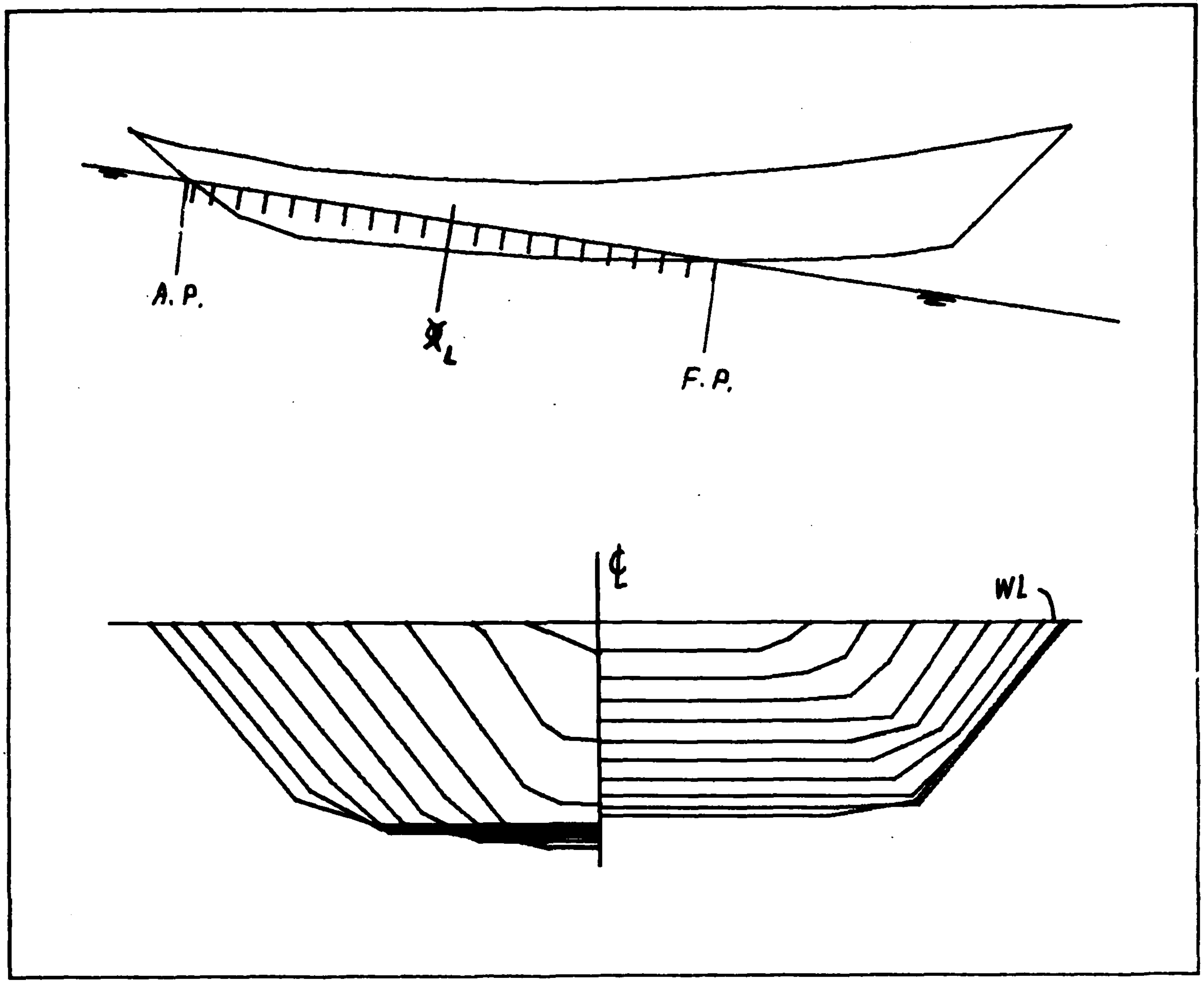

Figure 49a.UNDERBODY SHAPE OF DORY IN TEST SERIES 2700 (AS "SEEN" BY HANSEL)

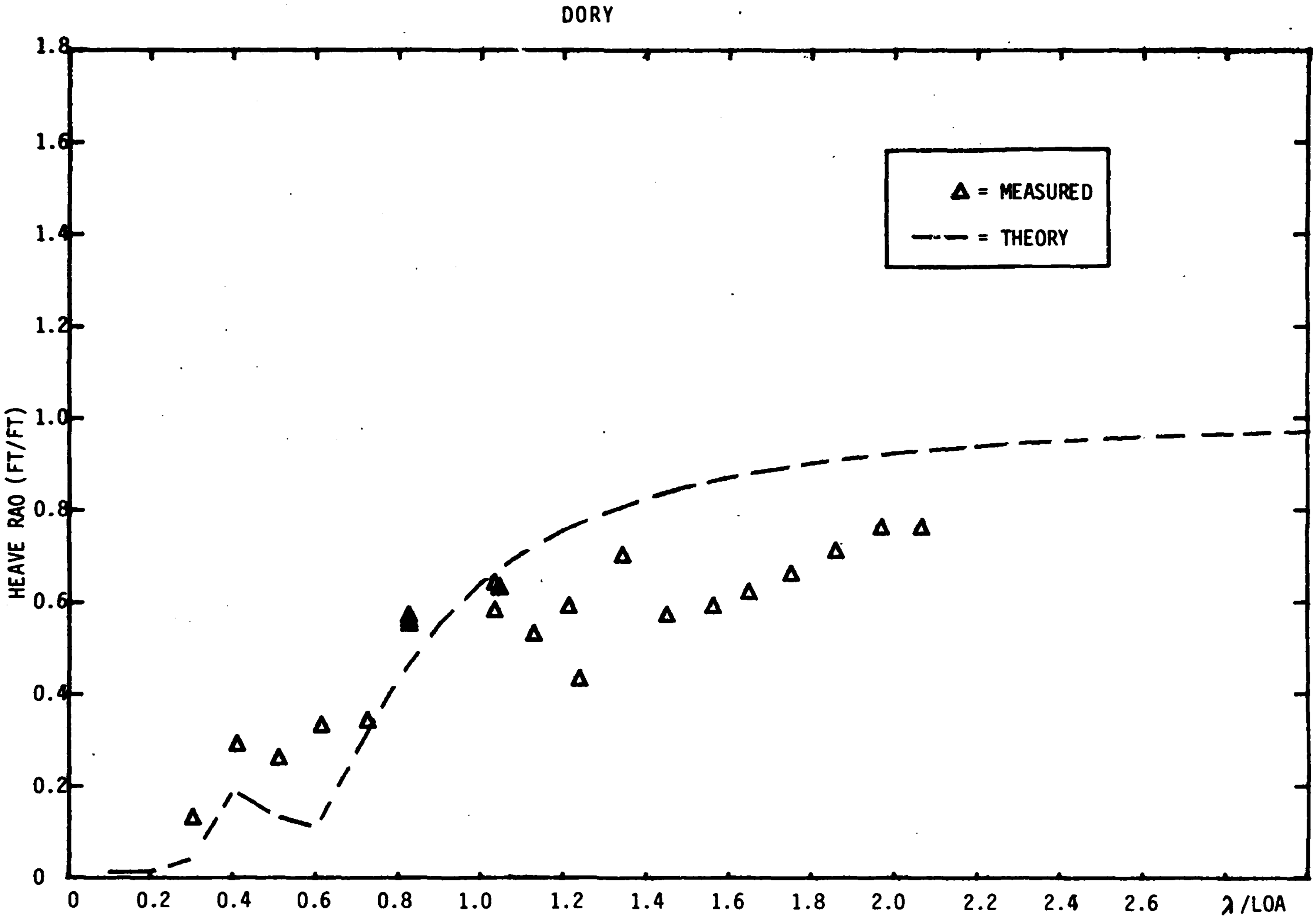

FIGURE 49 b. HEAVE RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 2700

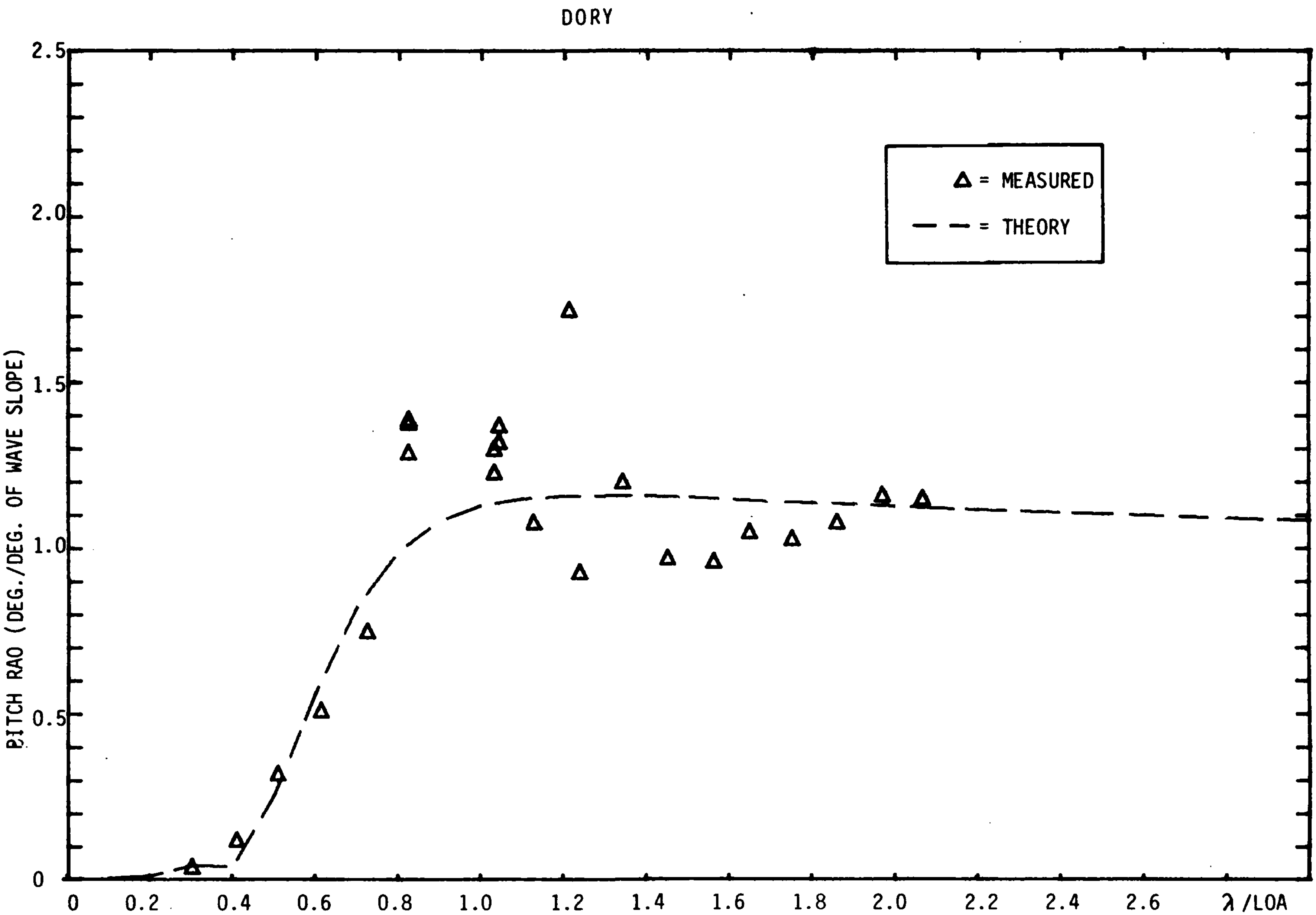

FIGURE 49 c. PITCH RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 2700

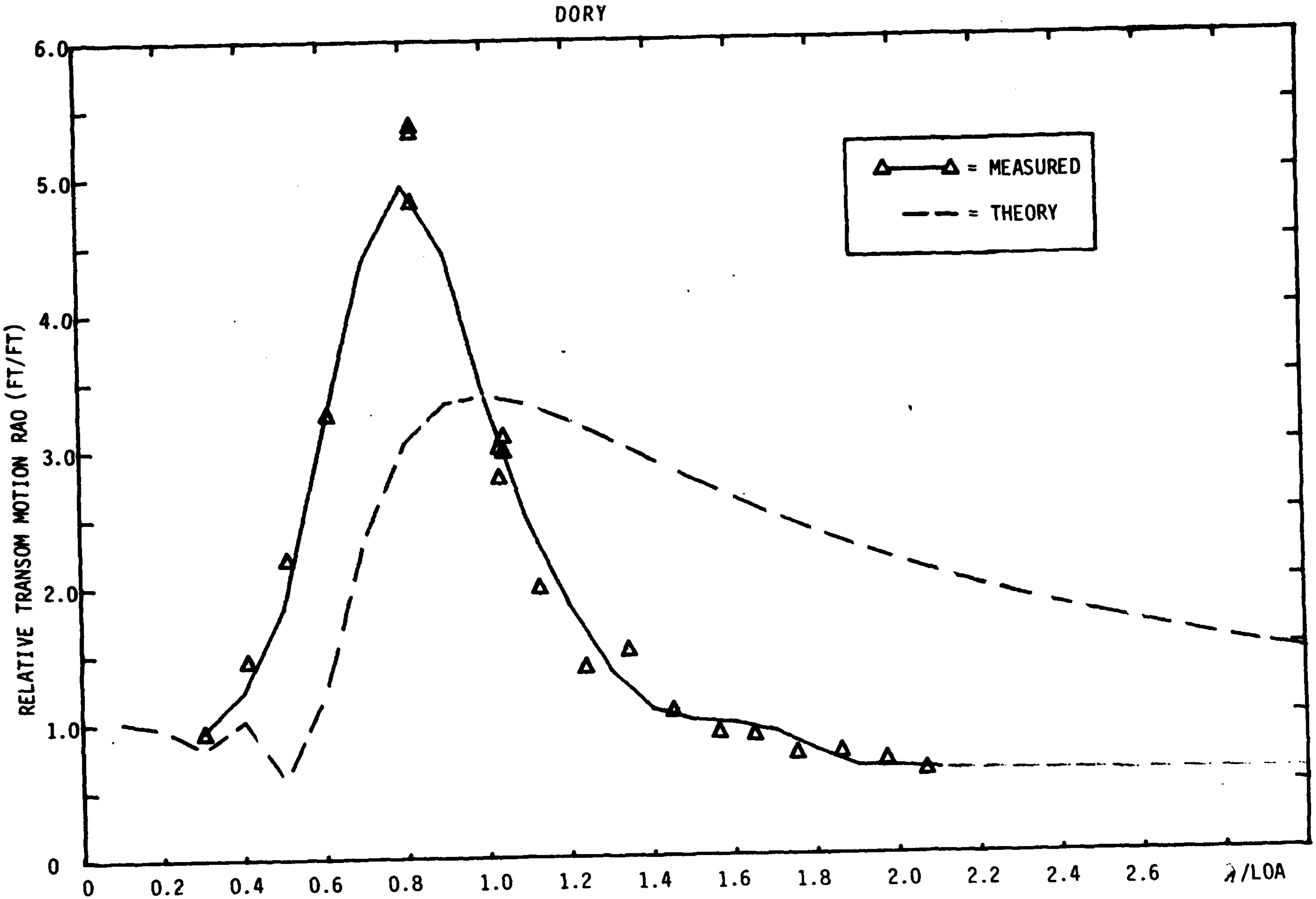

FIGURE 49 d. TRANSOM RELATIVE MOTION RAO, STERN WAVES, 1 MAN AFT, TEST SERIES 2700

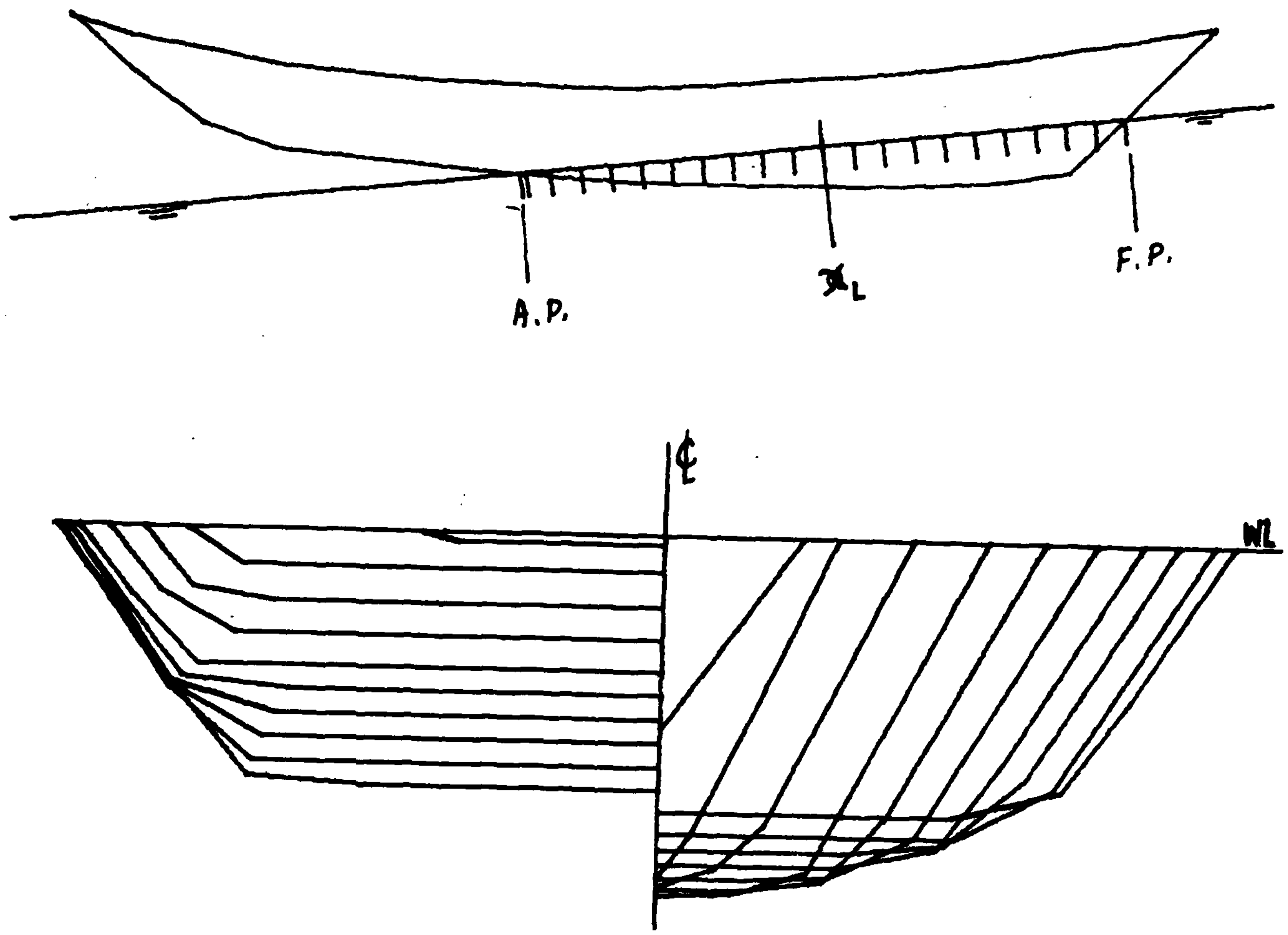

Figure 50a.UNDERBODY SHAPE OF DORY IN TEST SERIES 2800 (AS "SEEN" BY HANSEL)

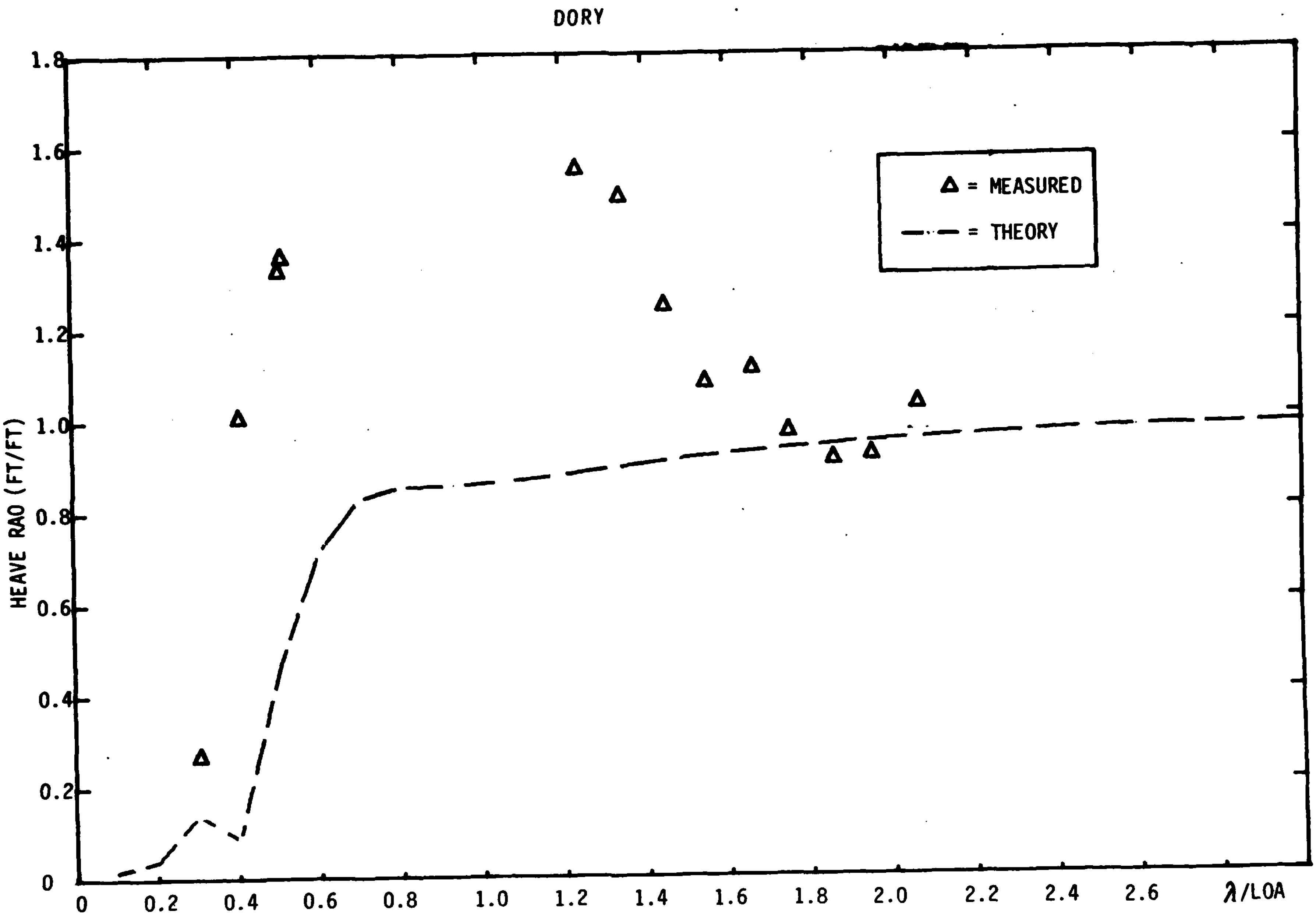

FIGURE 50 b. HEAVE RAO, BOW WAVES, 1 MAN FORWARD, TEST SERIES 2800

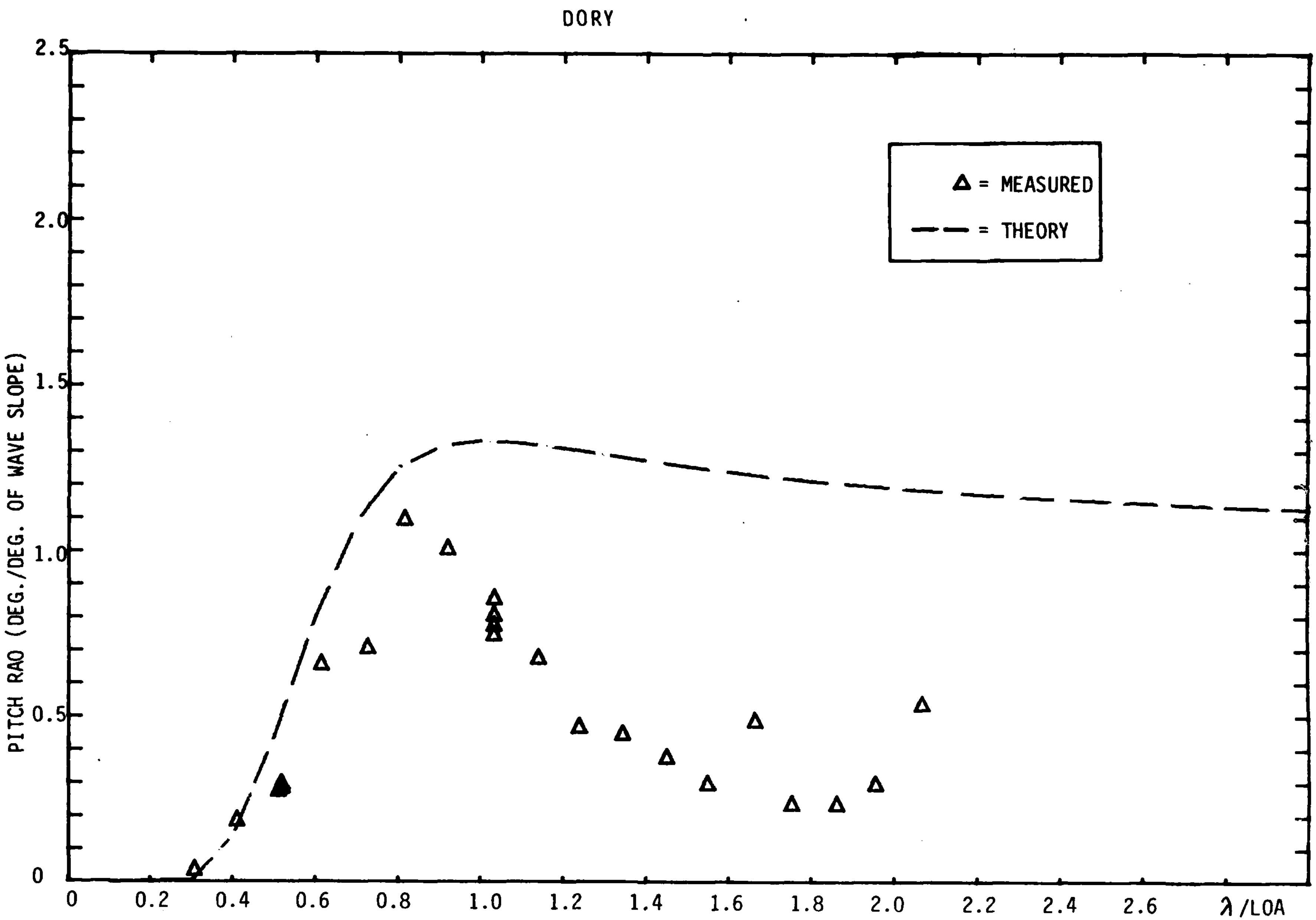

FIGURE 50 c. PITCH RAO, BOW WAVES, 1 MAN FORWARD, TEST SERIES 2800

DORY

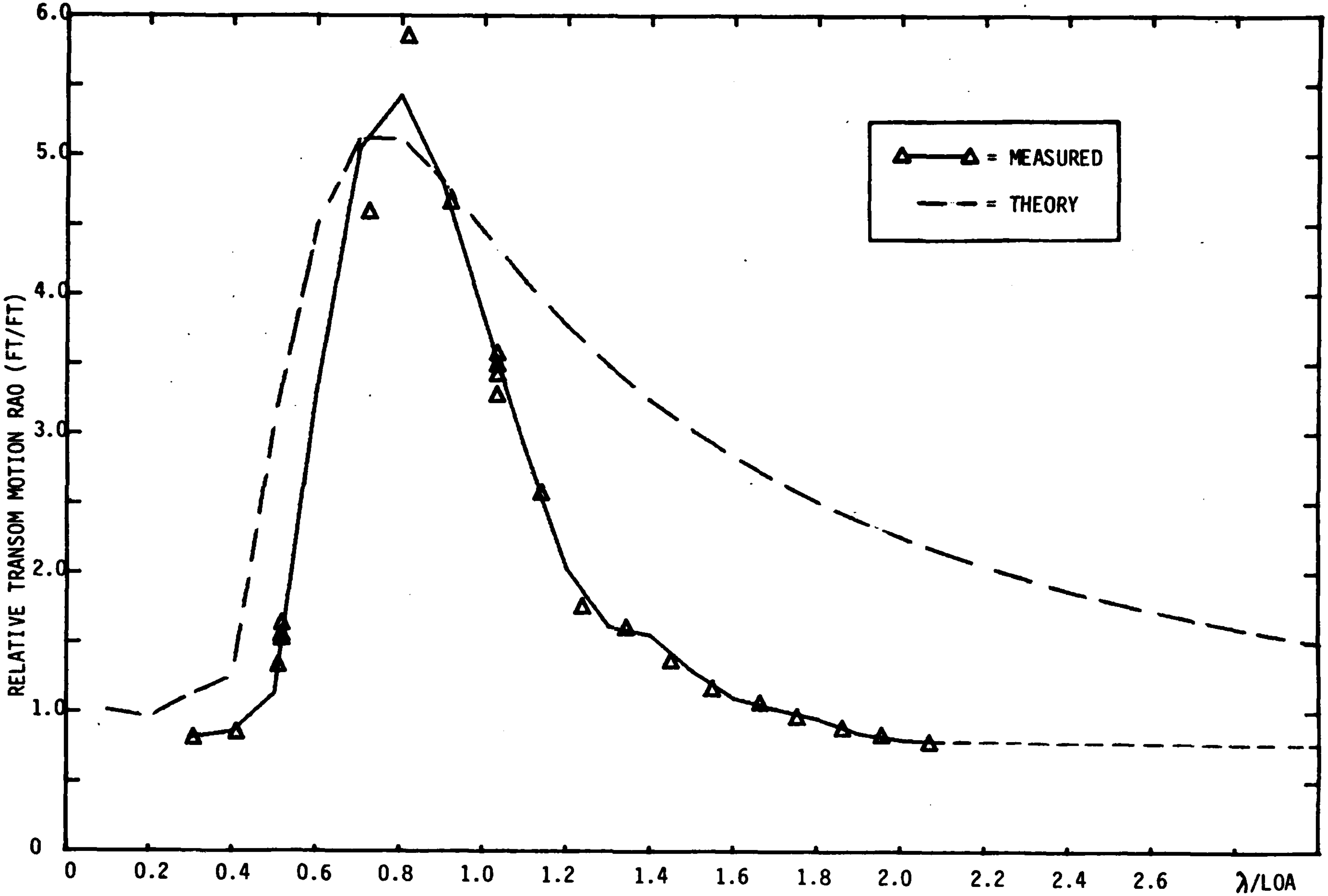

FIGURE 50 d. TRANSOM RELATIVE MOTION RAO, BOW WAVES, 1 MAN FORWARD, TEST SERIES 2800

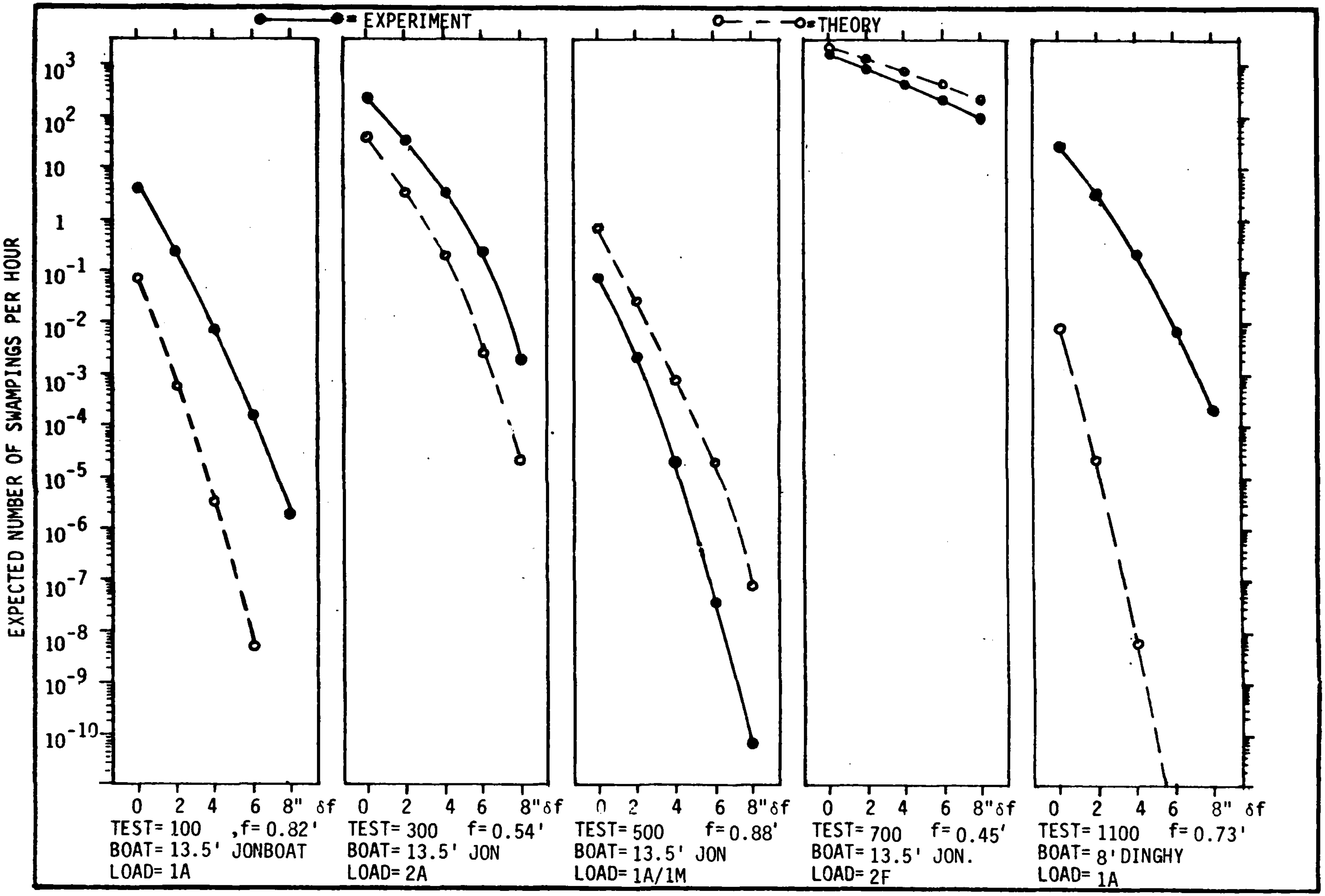

FIG. 52 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 1

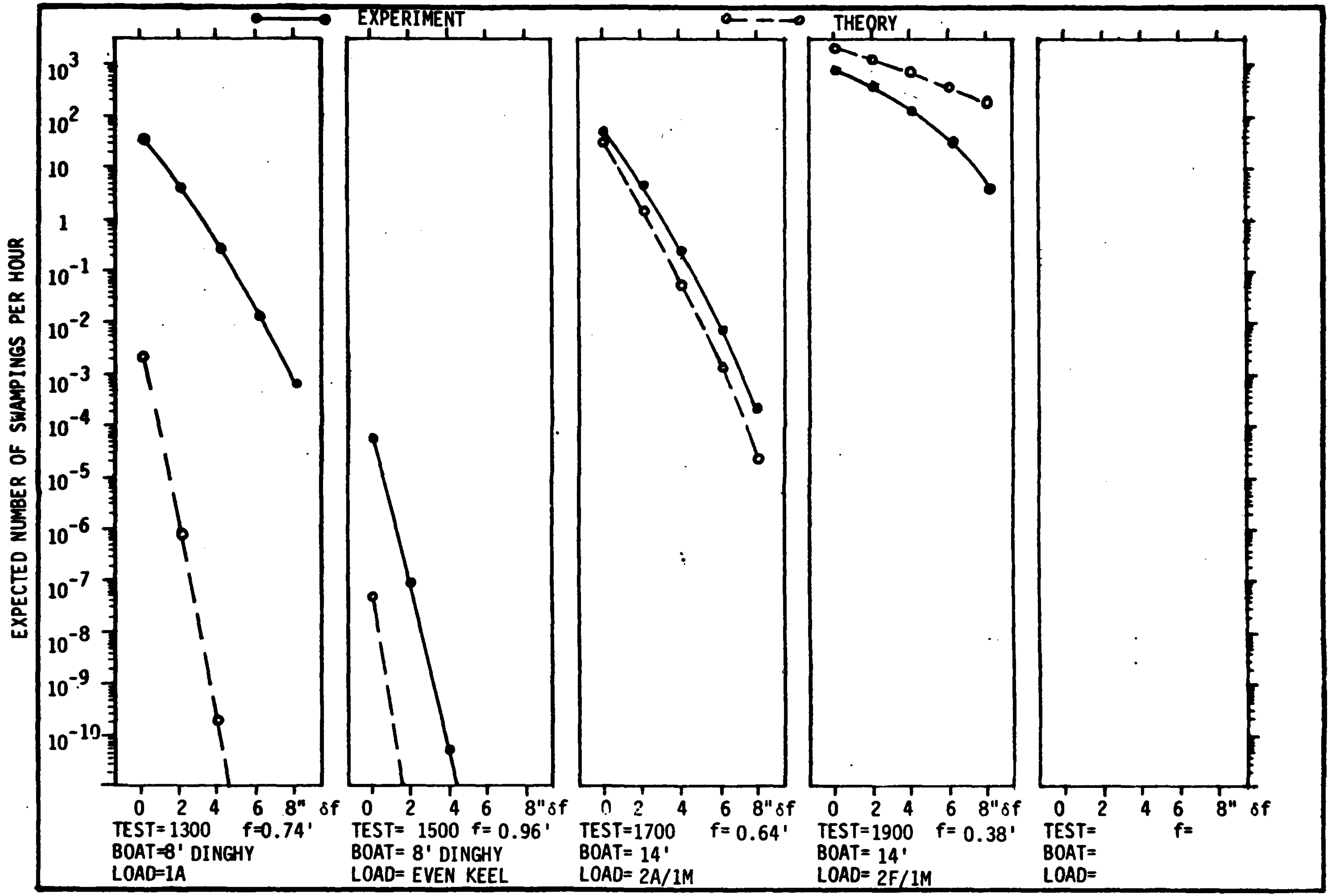

FIG. 52 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 1

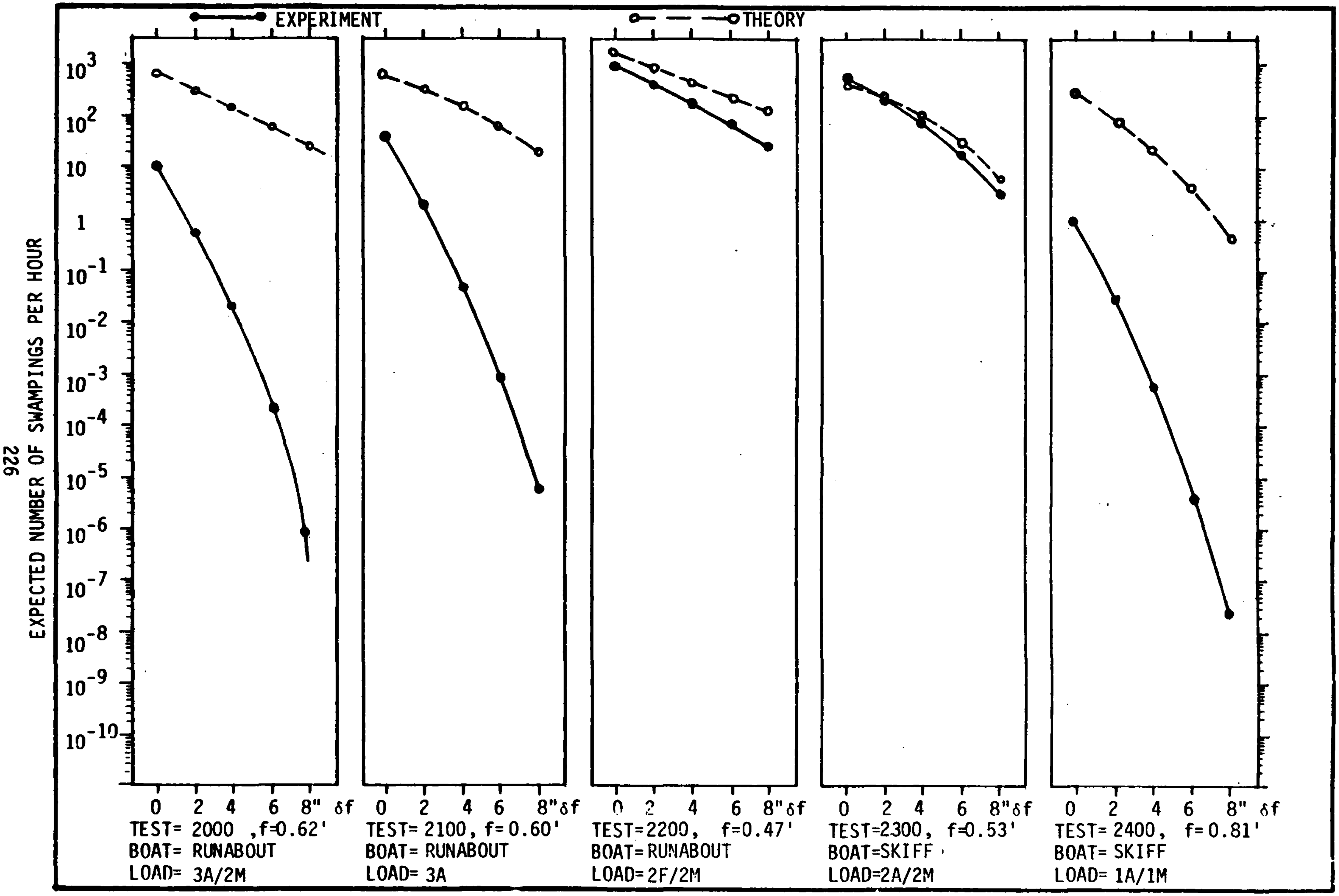

FIG. 52 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 1

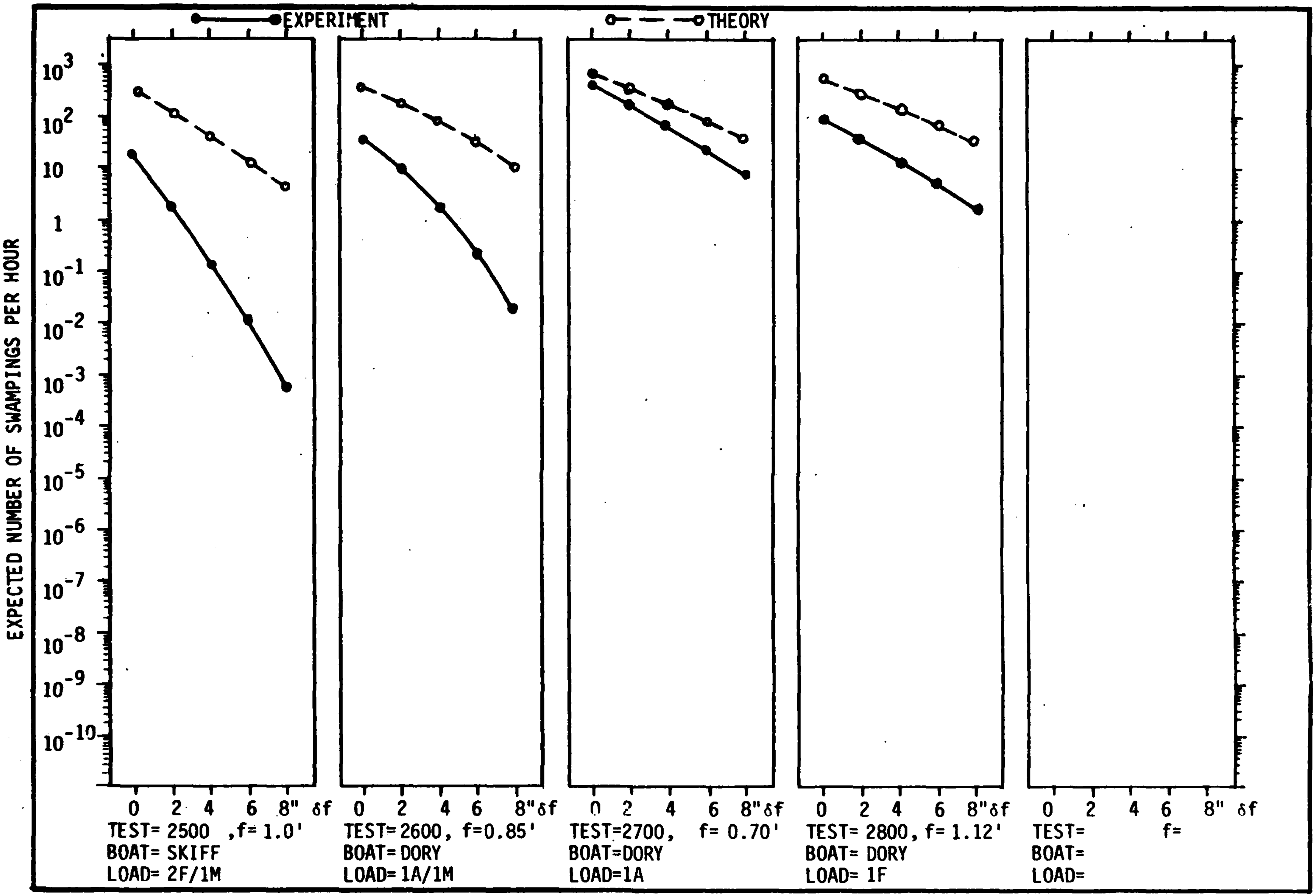

FIG. 52 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 1

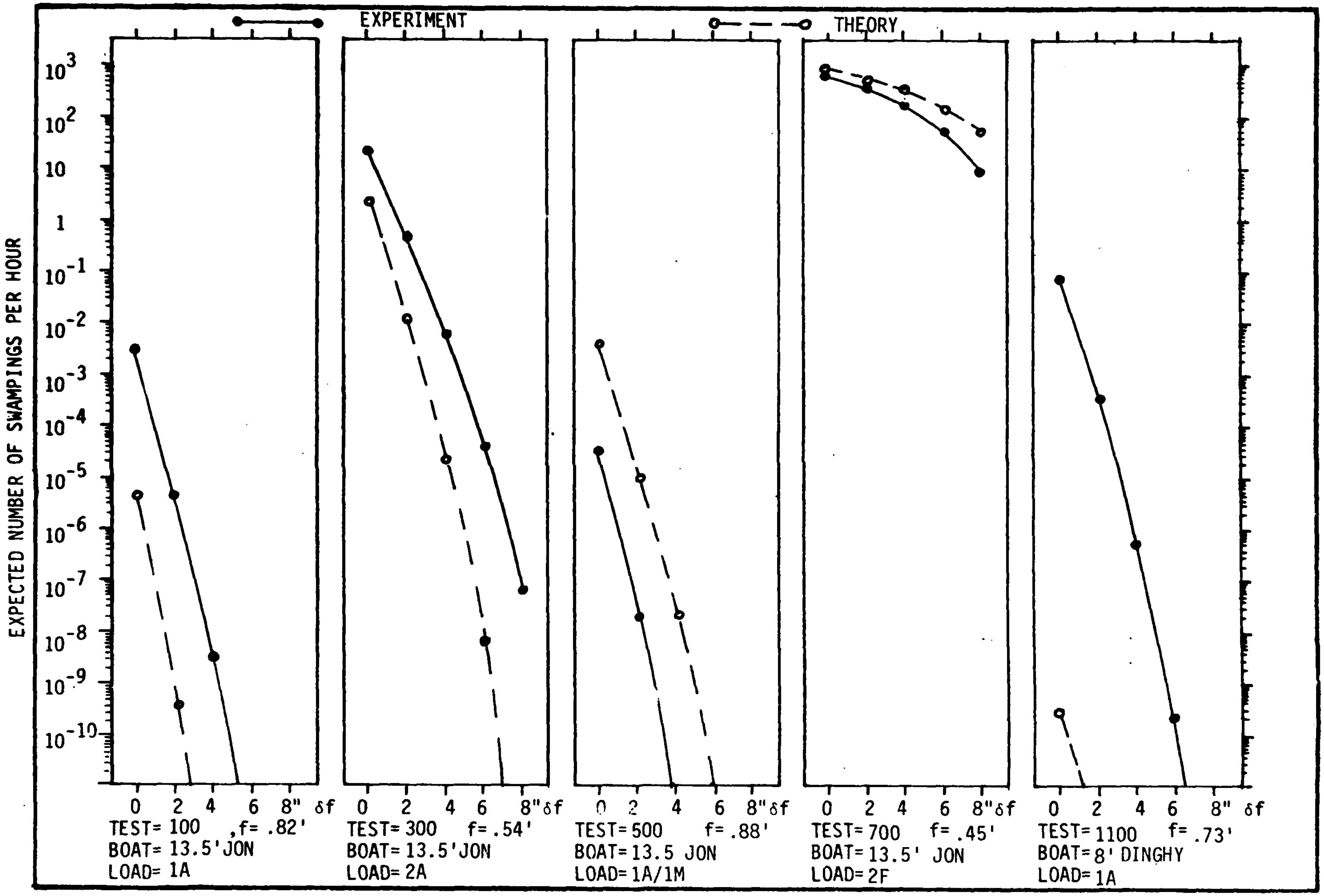

FIG. 53 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM =

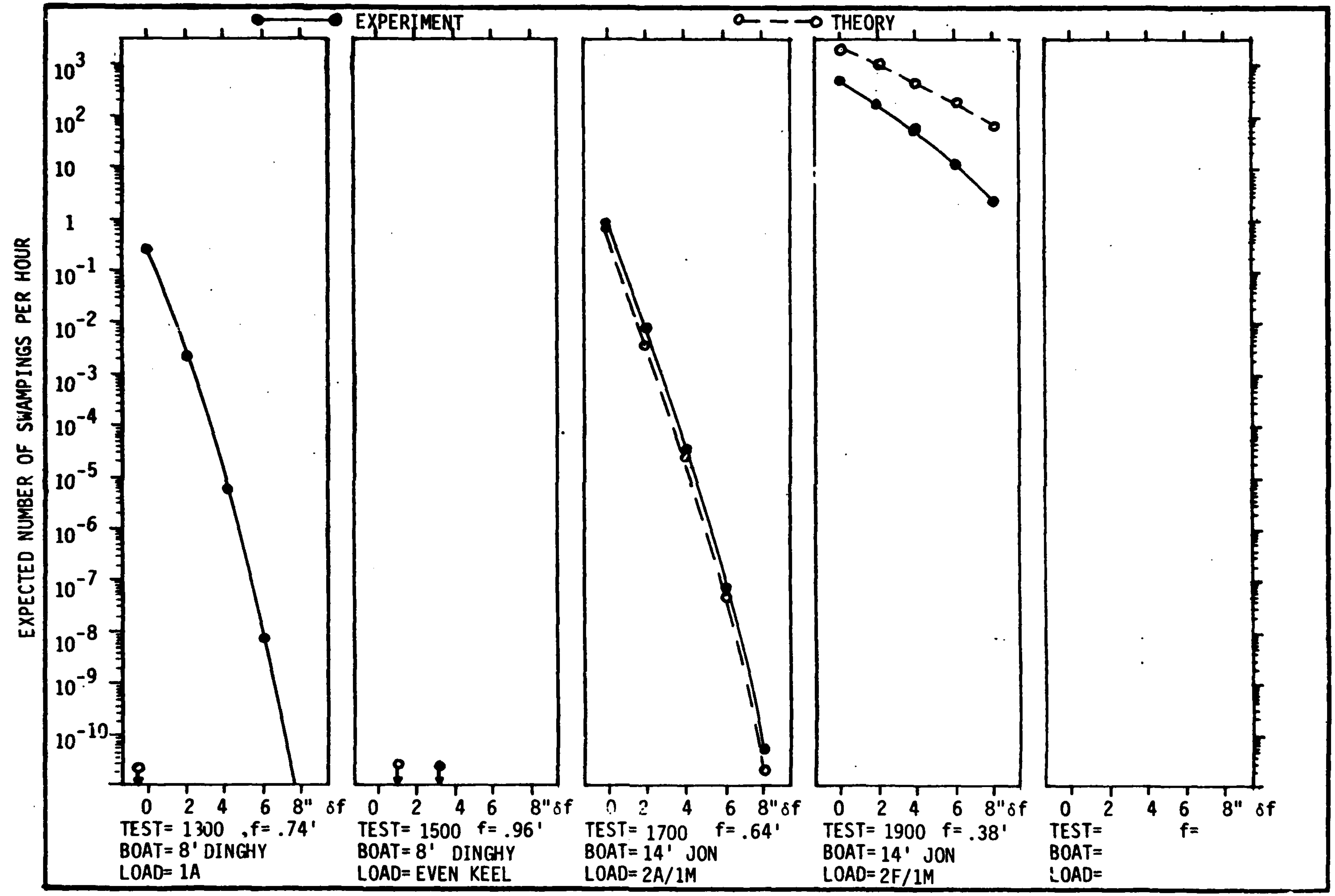

FIG. 53 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 2

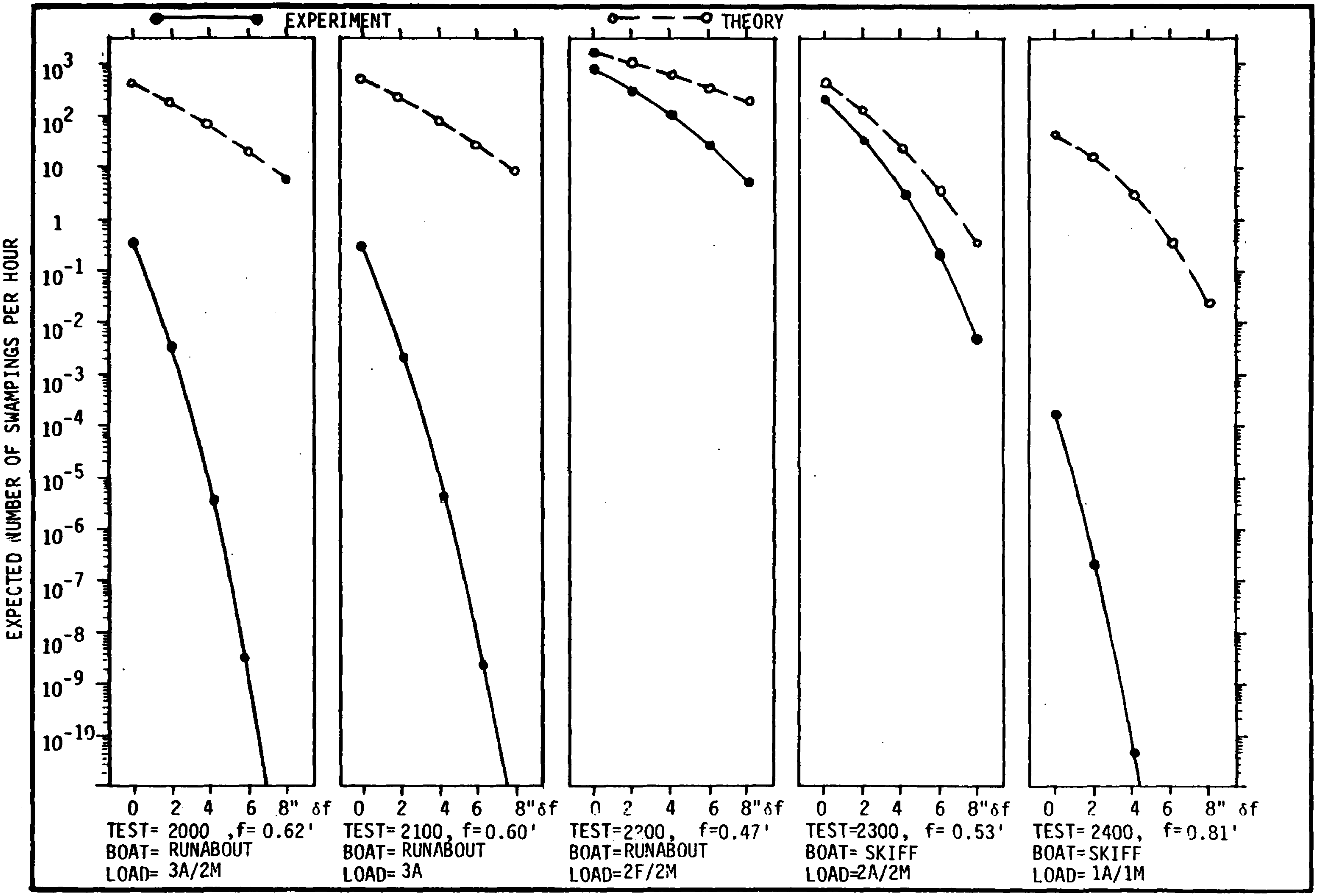

FIG. 53 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 2

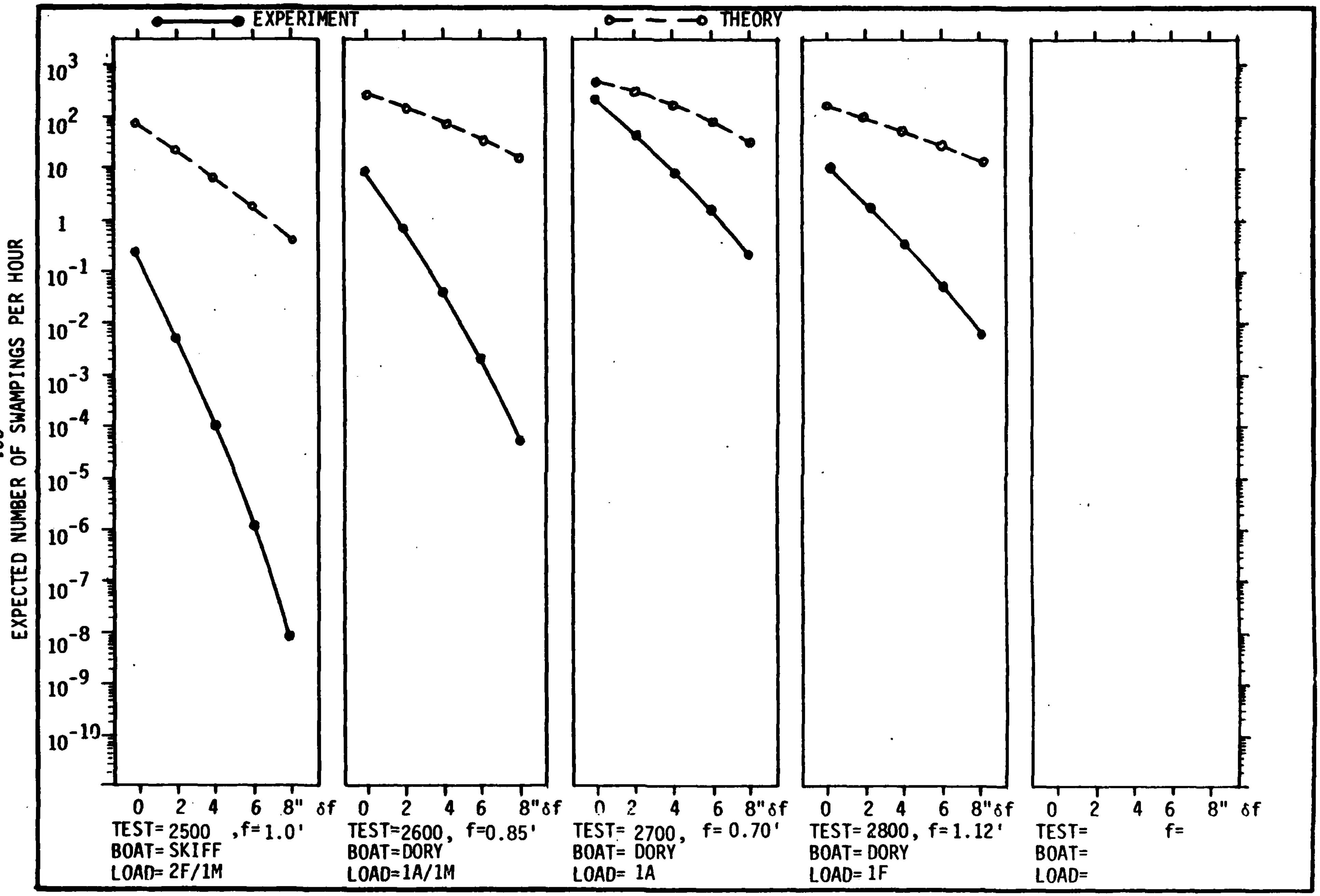

FIG. 53 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 2

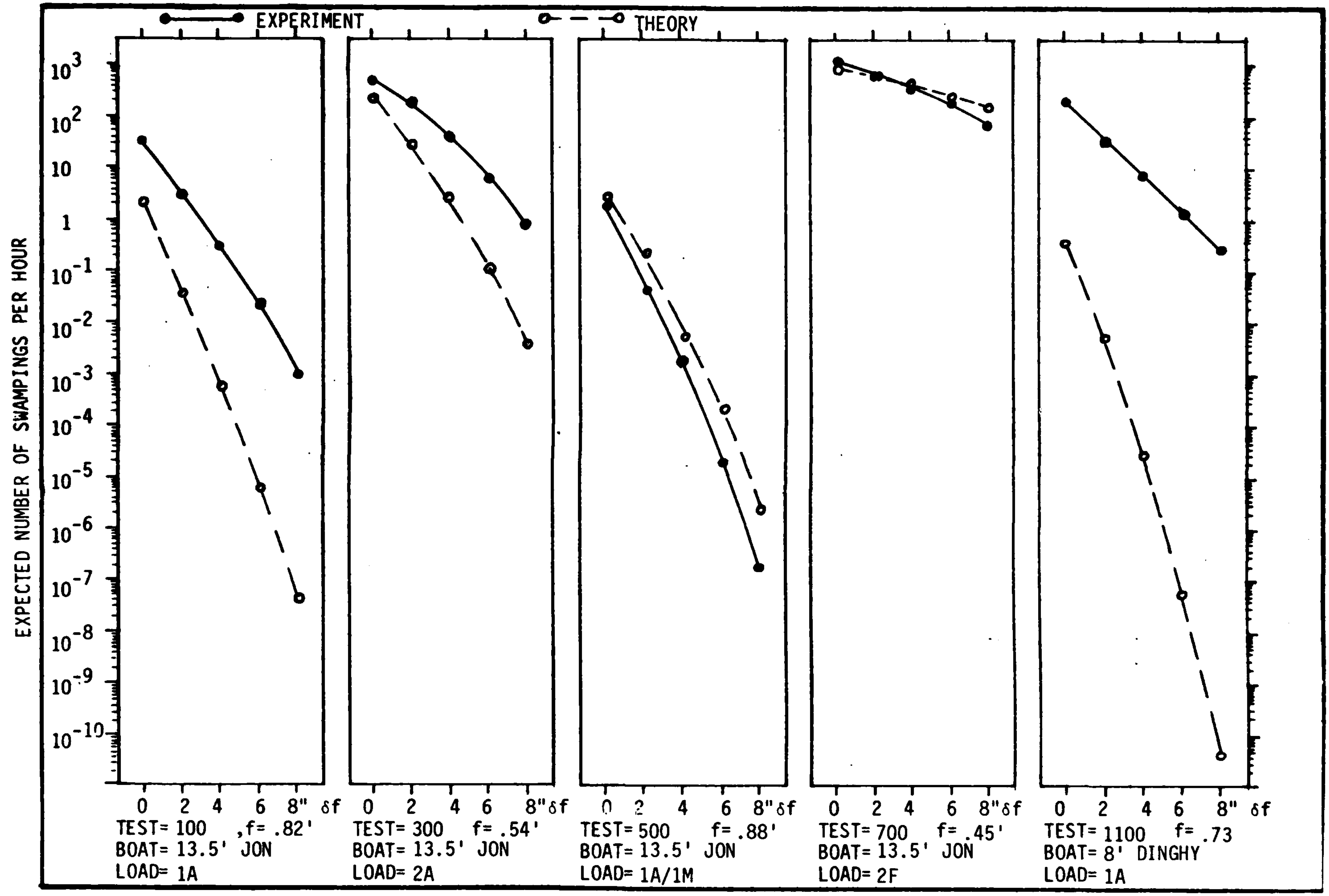

FIG. 54 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 3

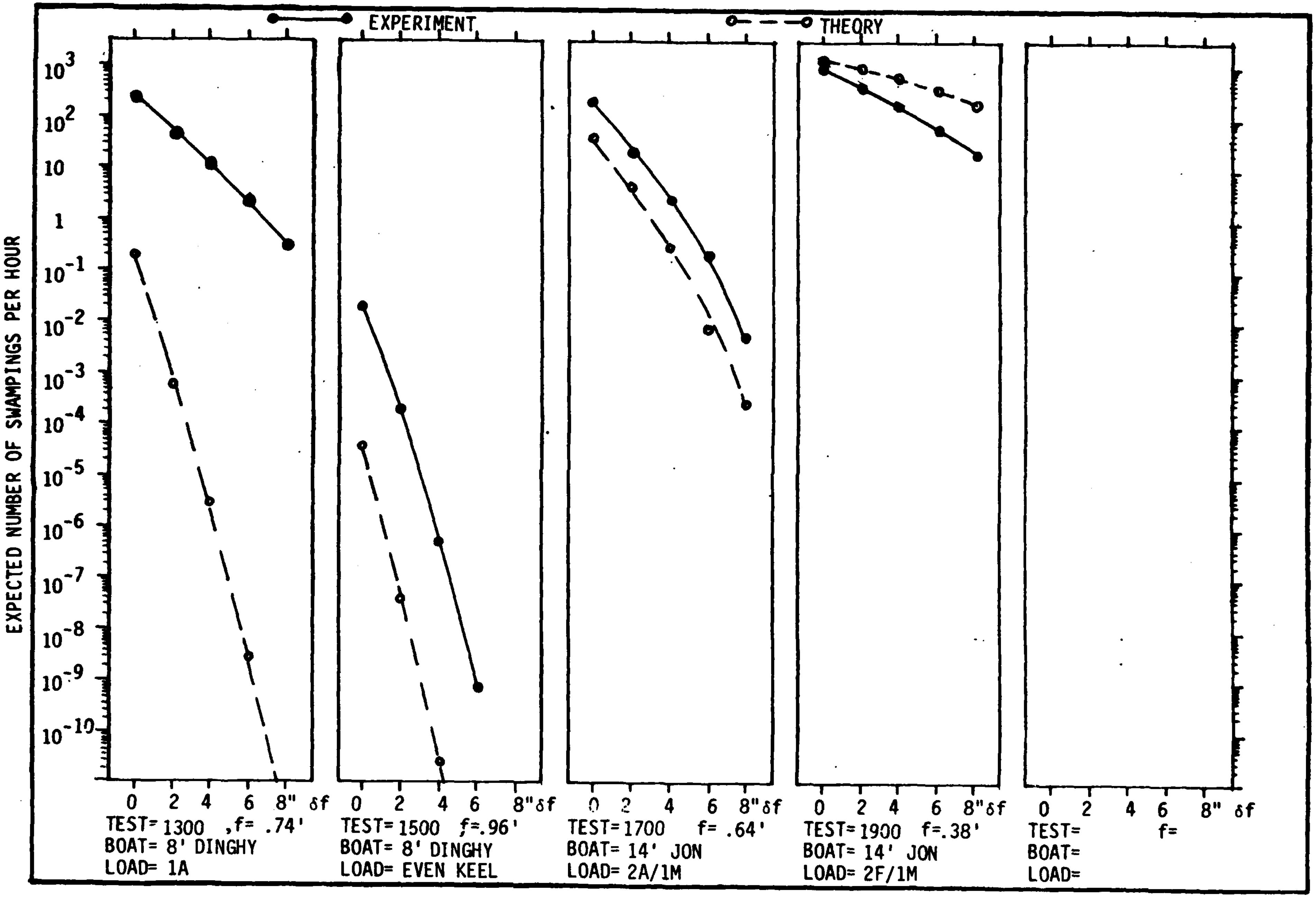

FIG. 54 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 3

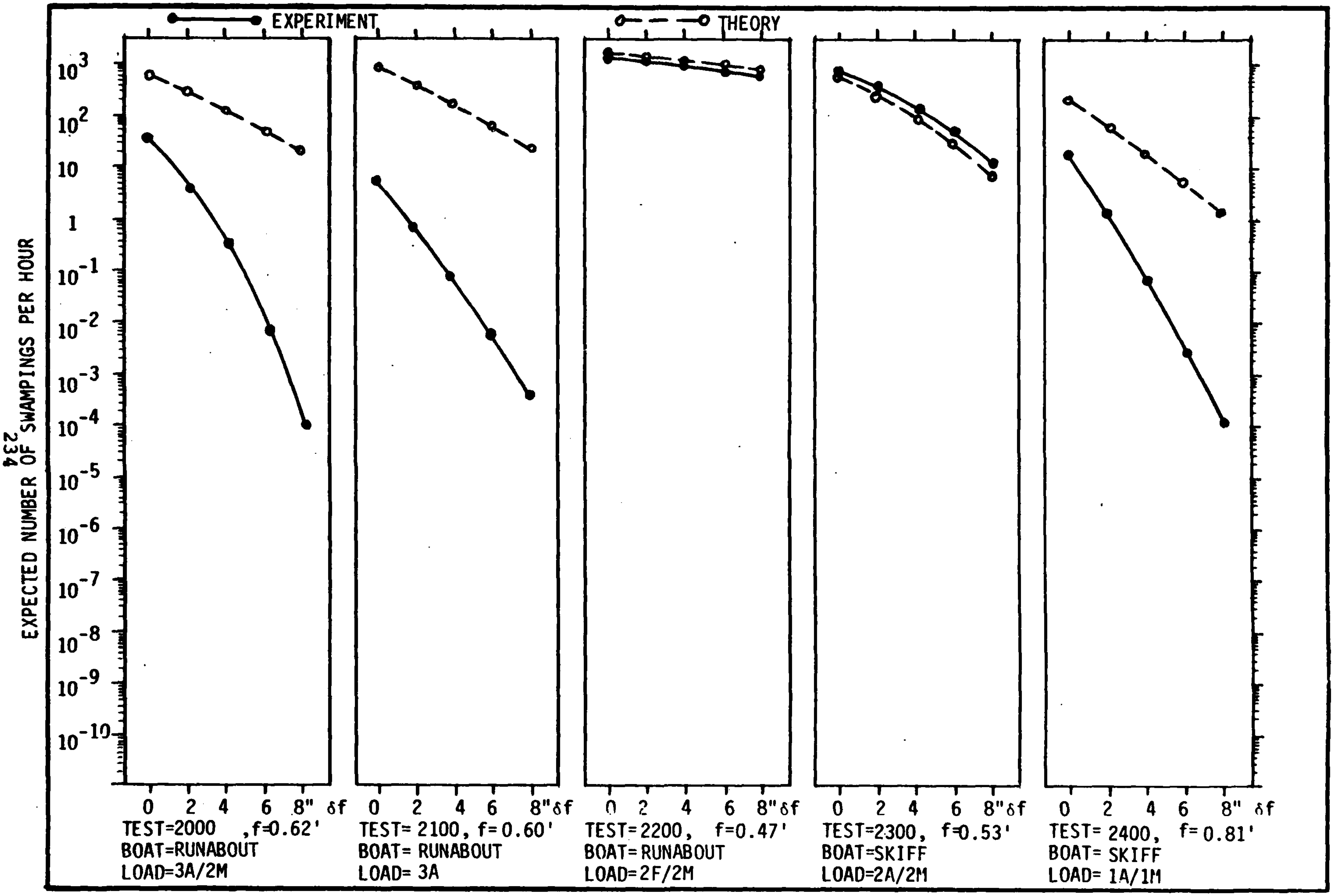

FIG. 54 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 3

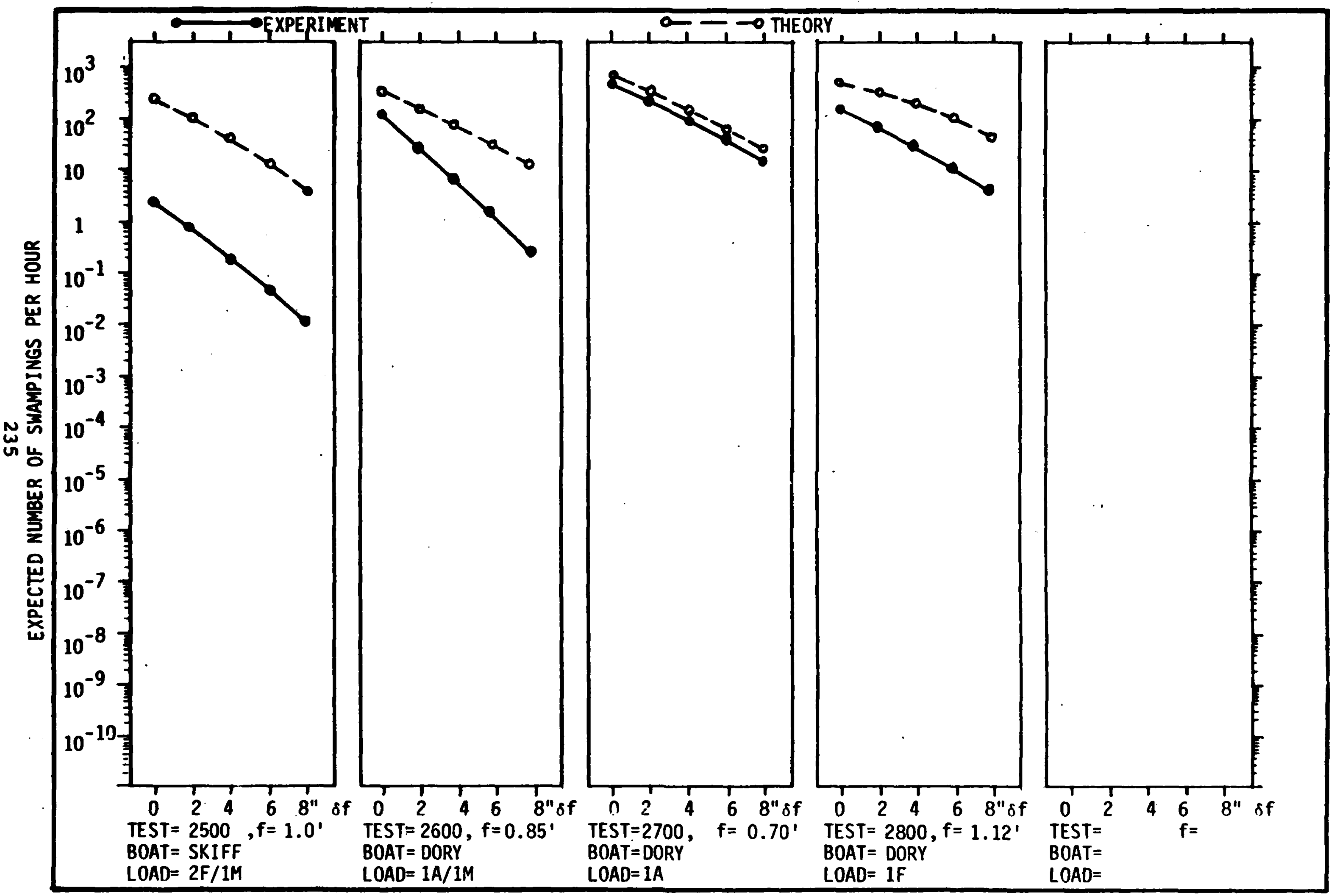

FIG. 54 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 3

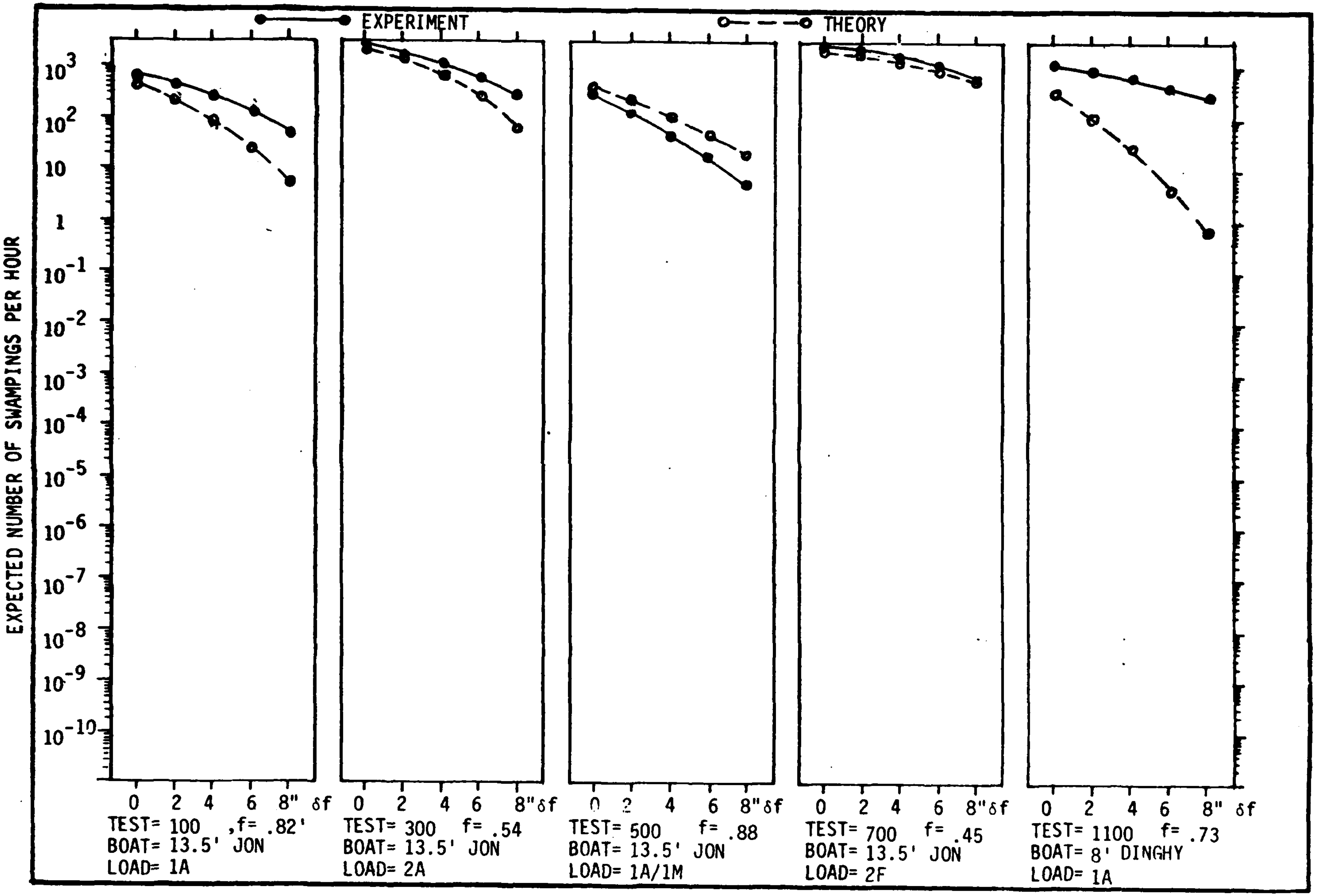

FIG. 55 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 4

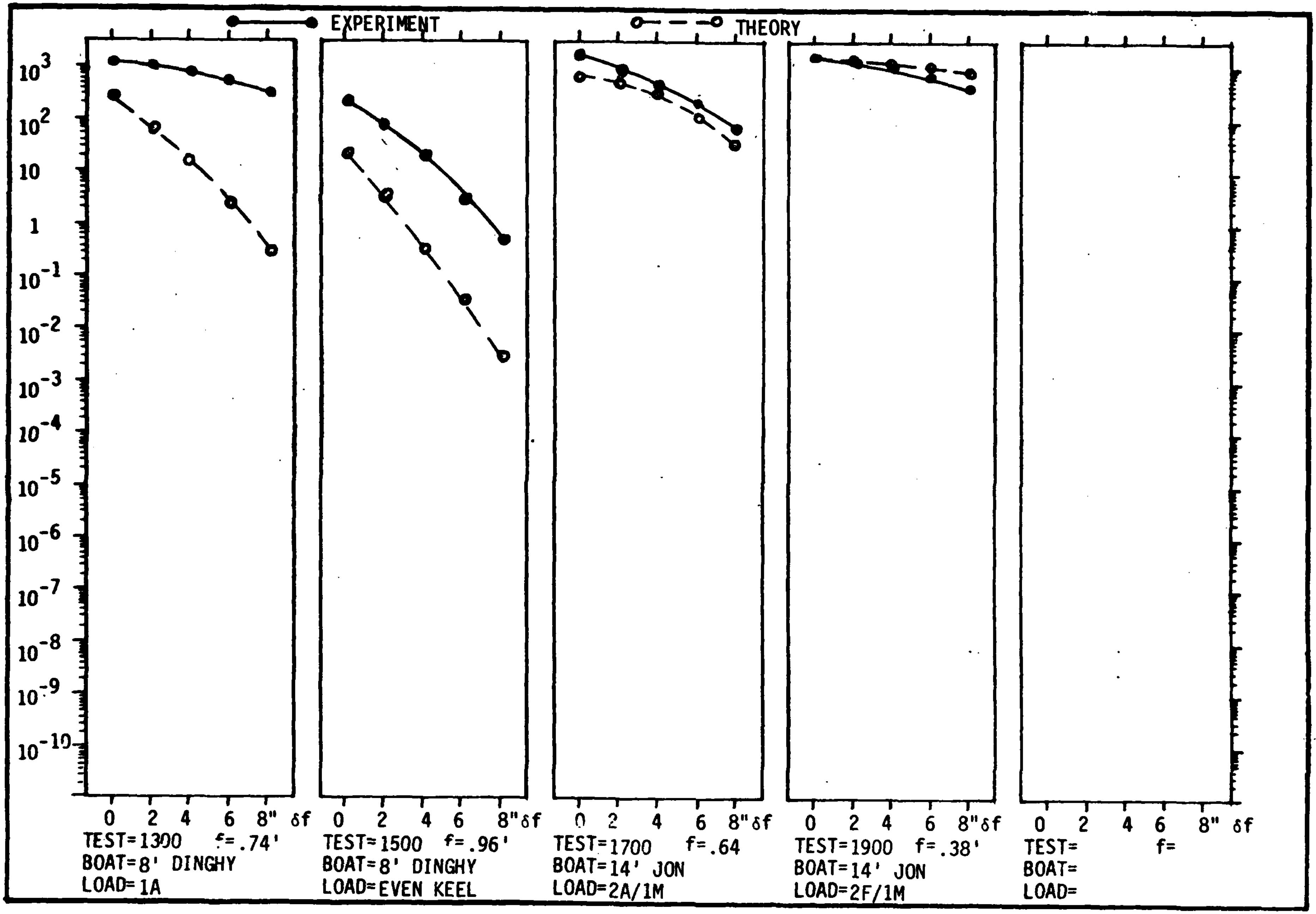

FIG. 55 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 4

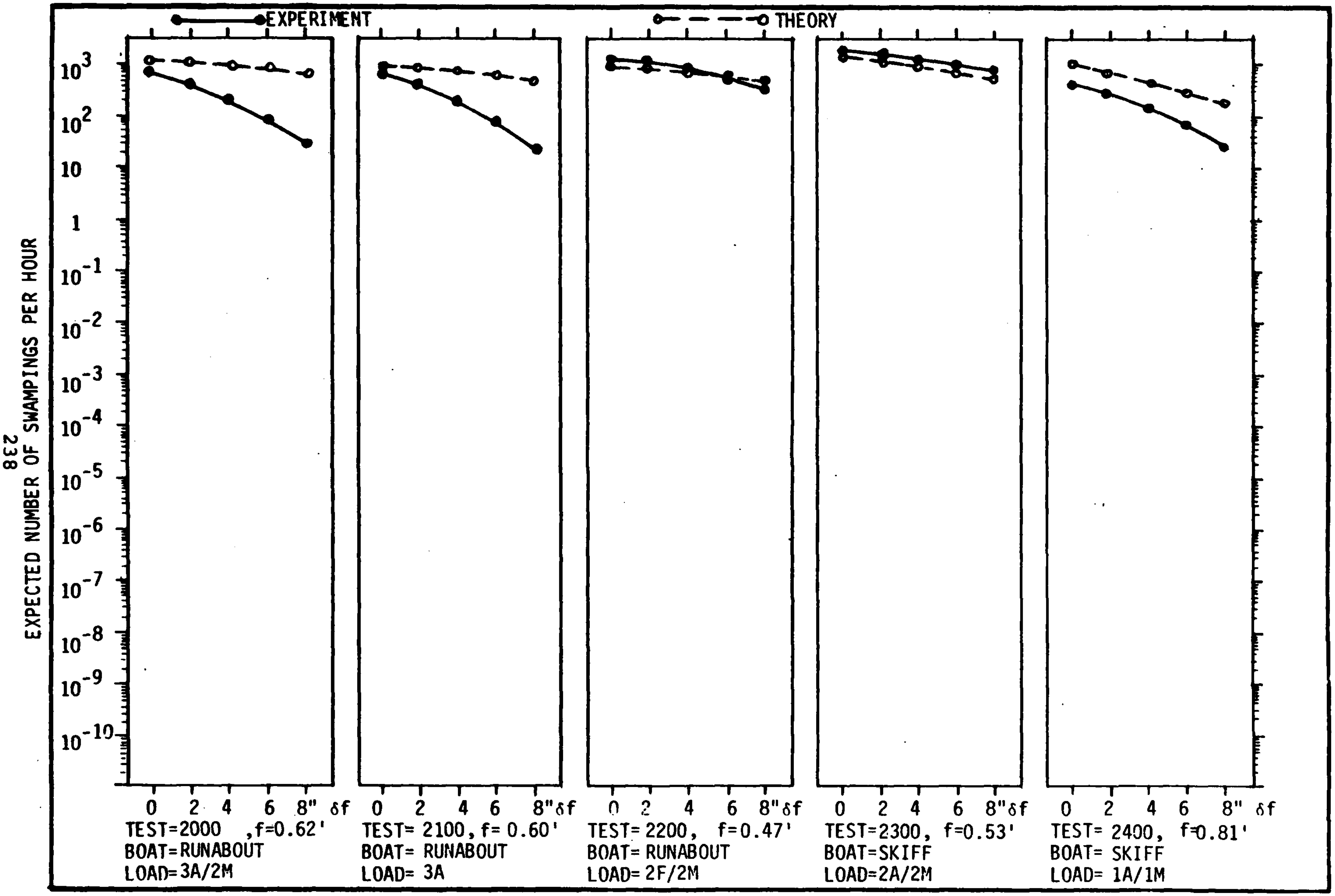

FIG. 55 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 4

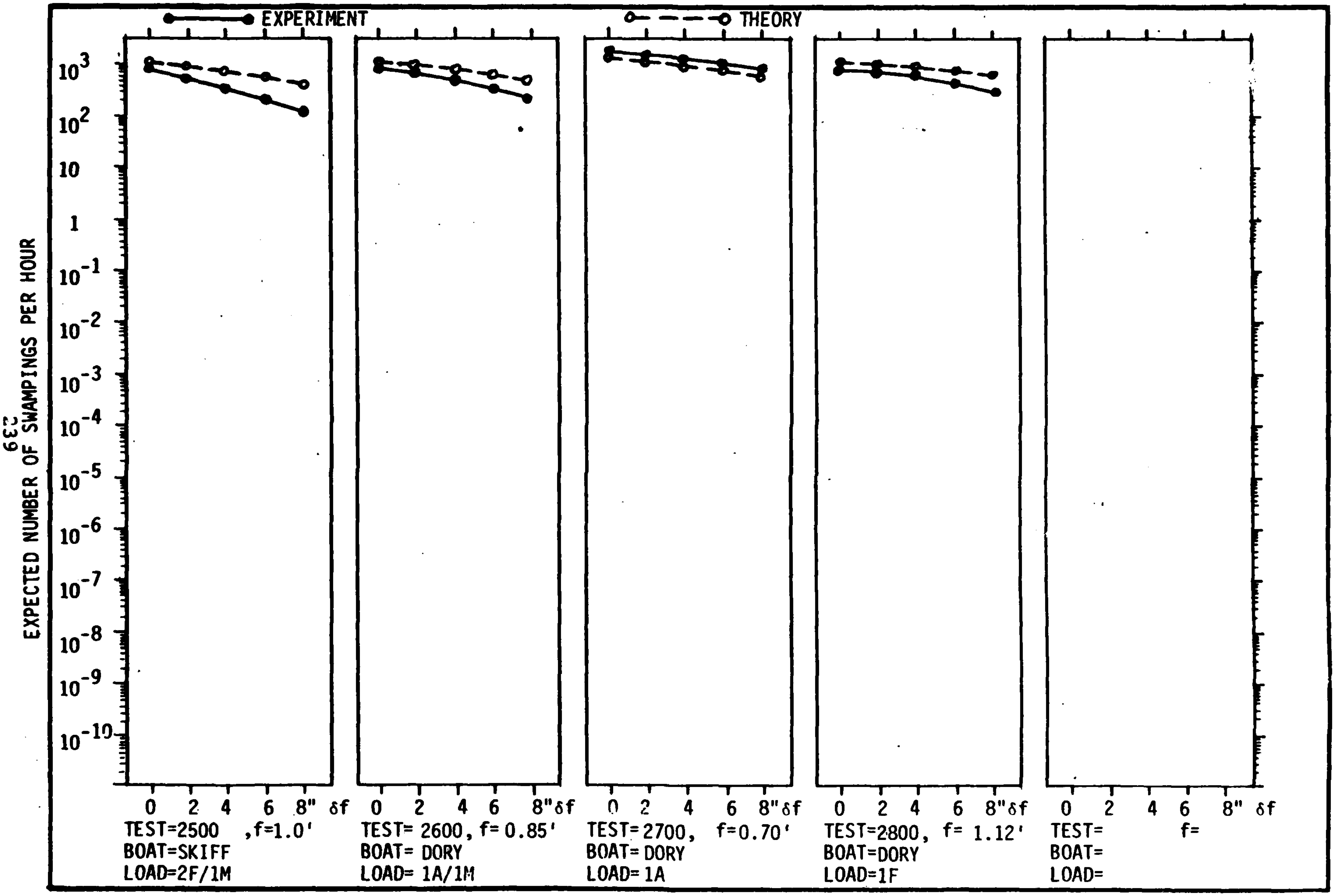

FIG. 55 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 4

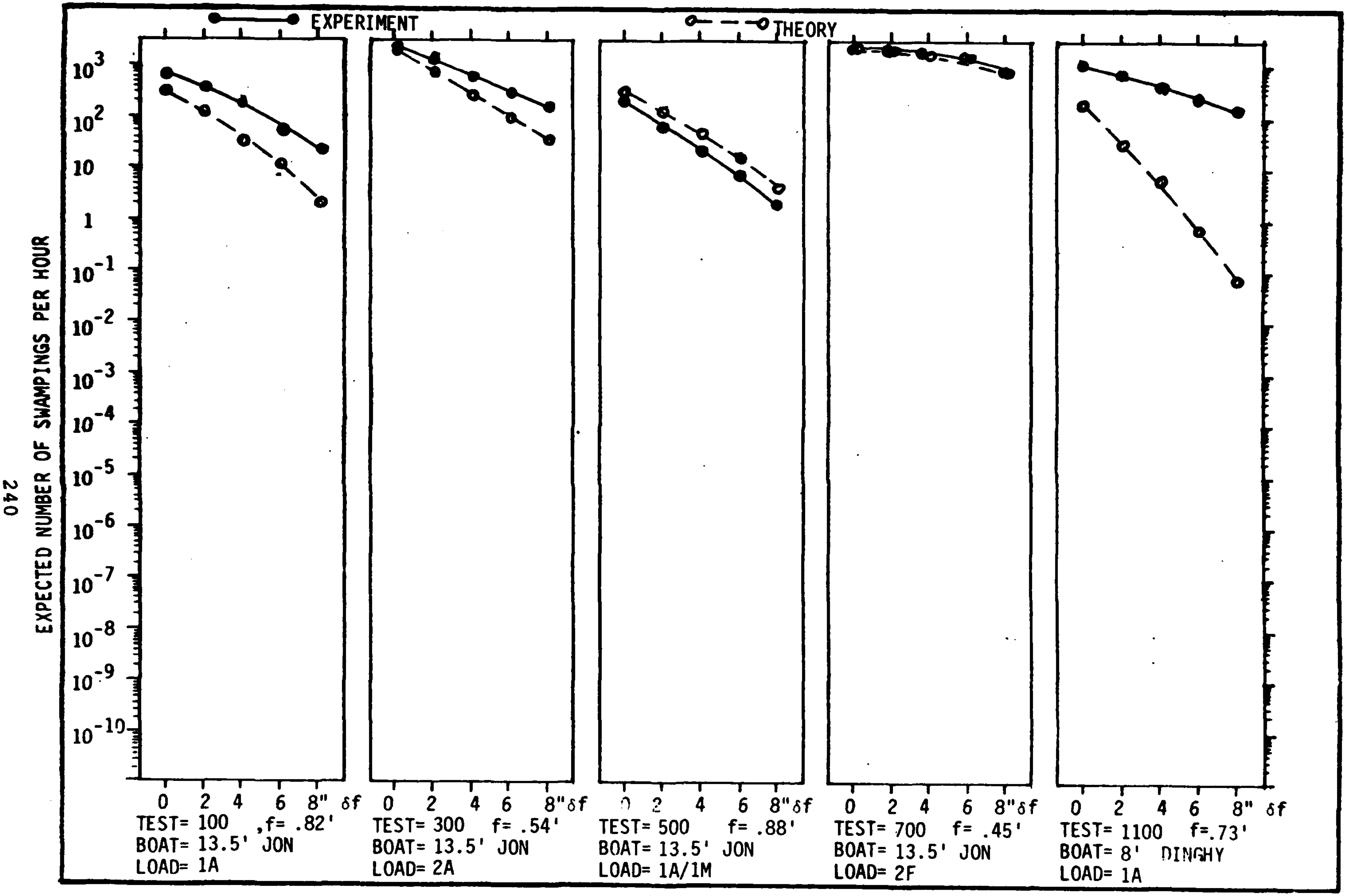

FIG. 56 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 5

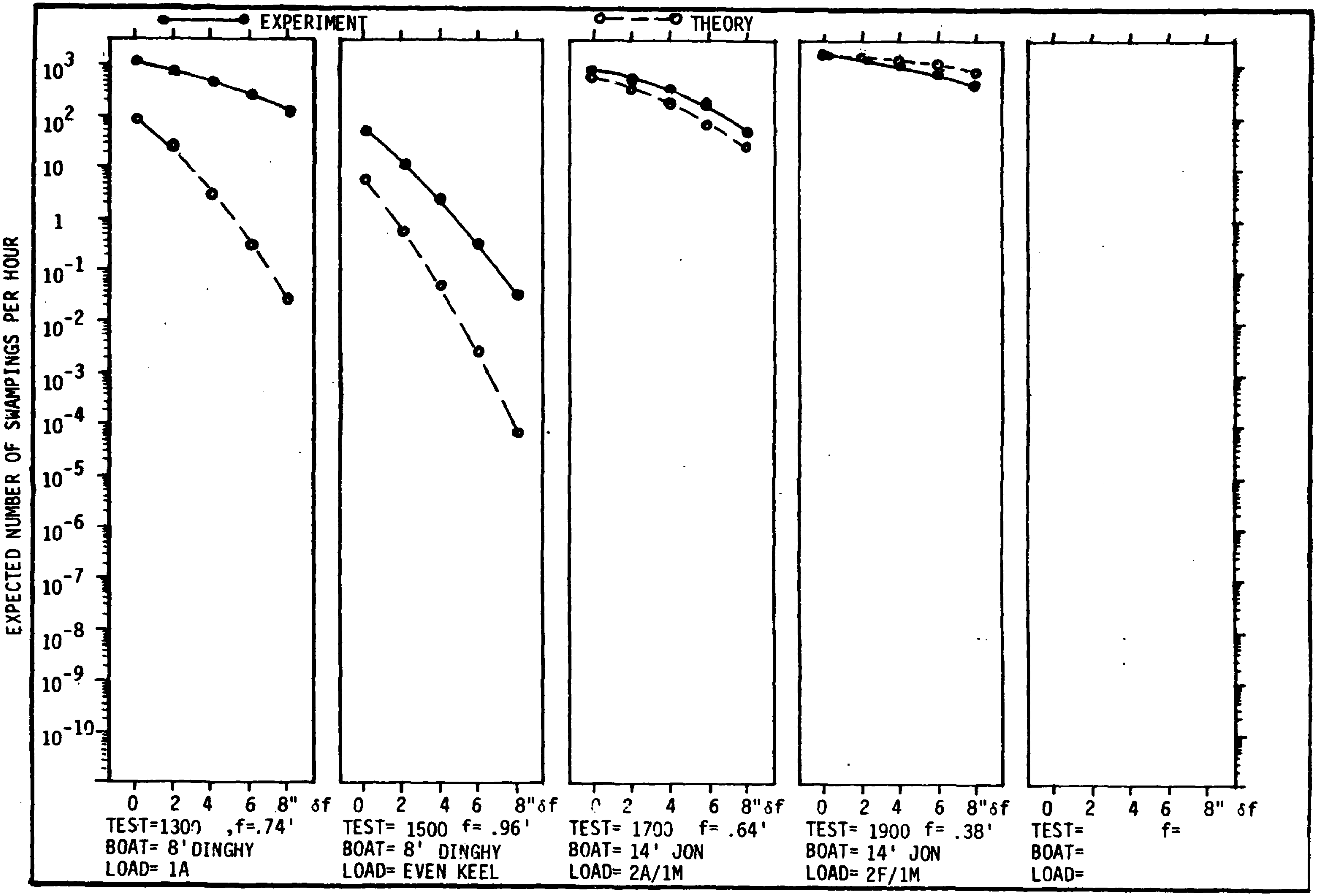

FIG. 56 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 5

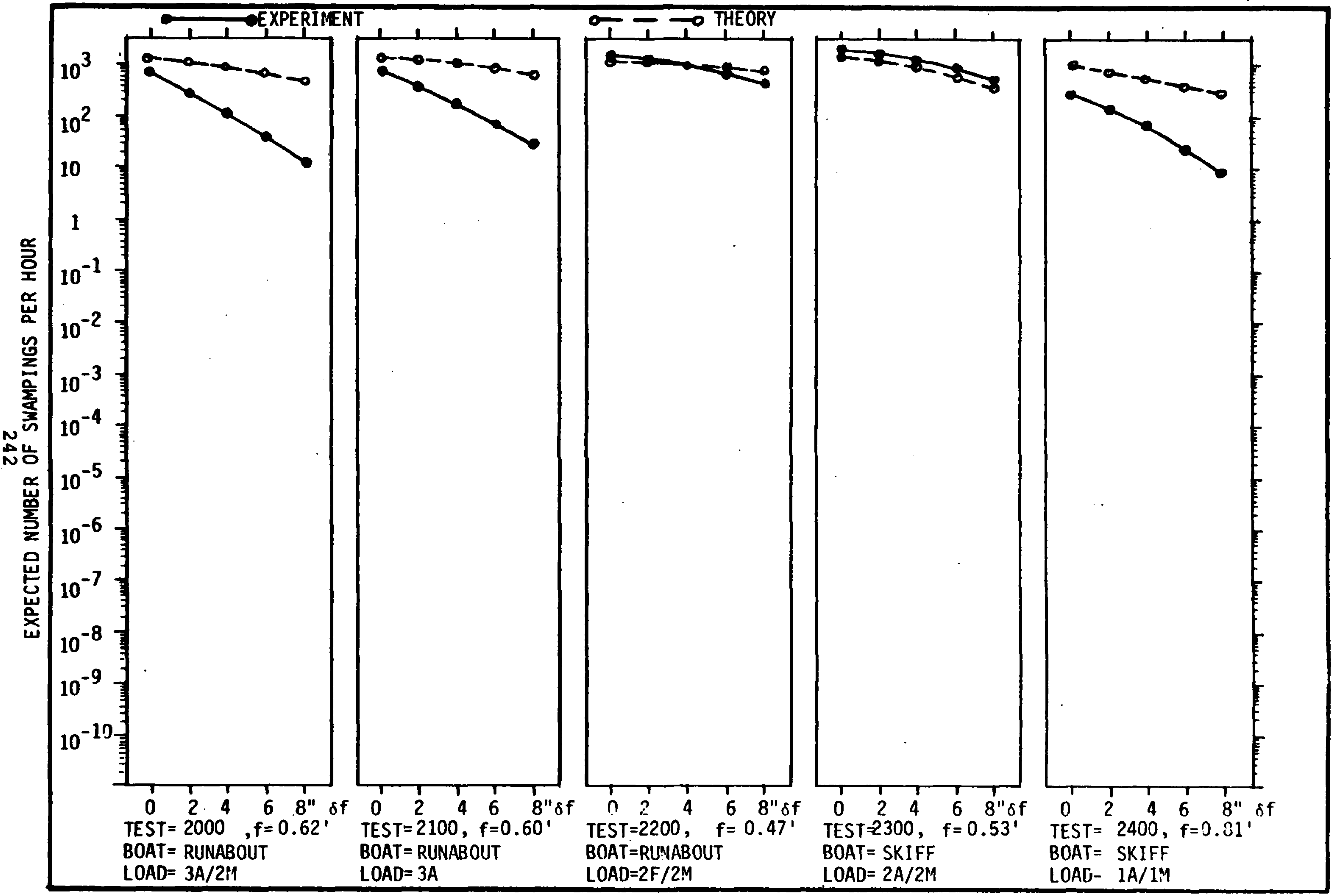

FIG. 56 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM =5

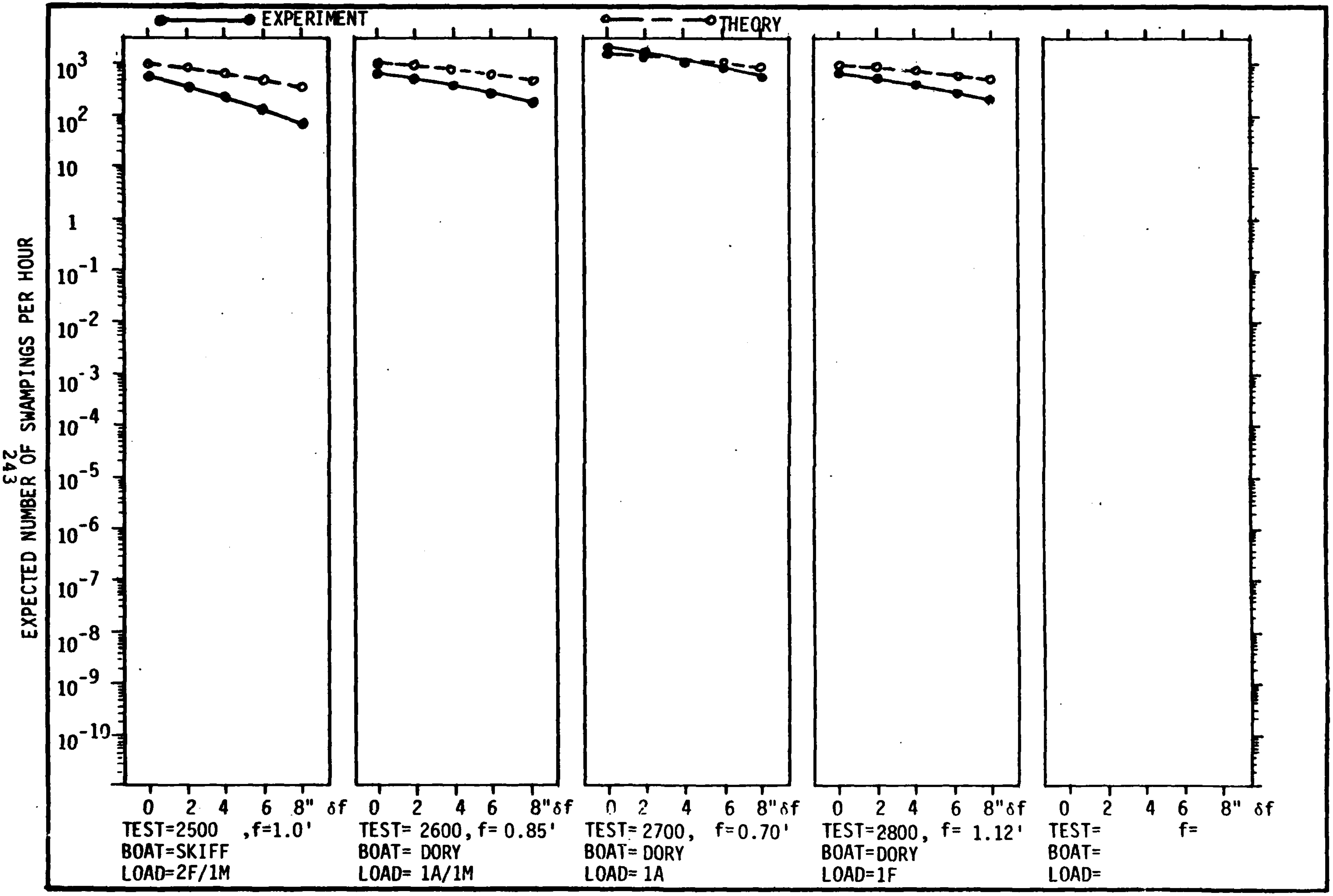

FIG. 56 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 5

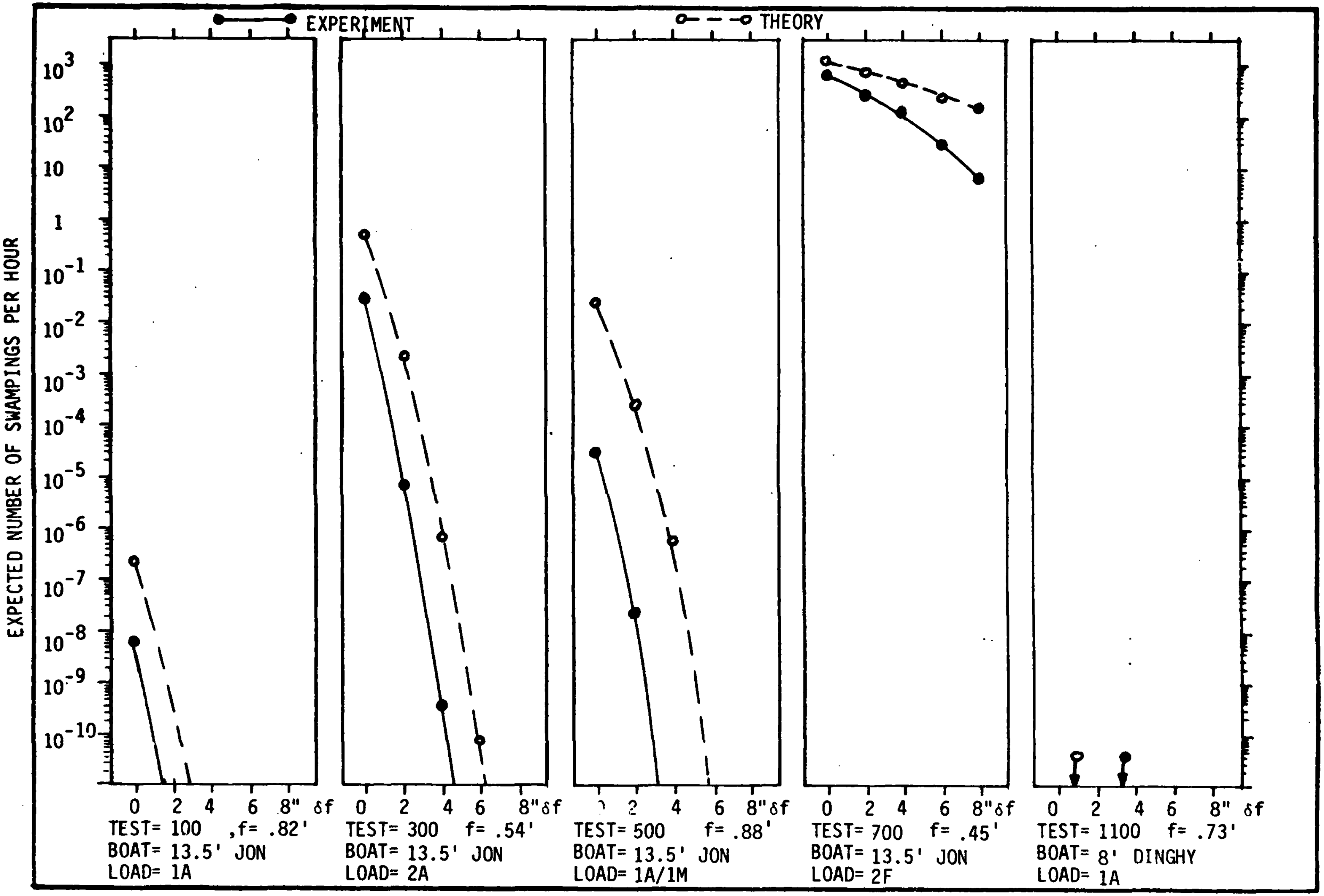

FIG. 57 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 6

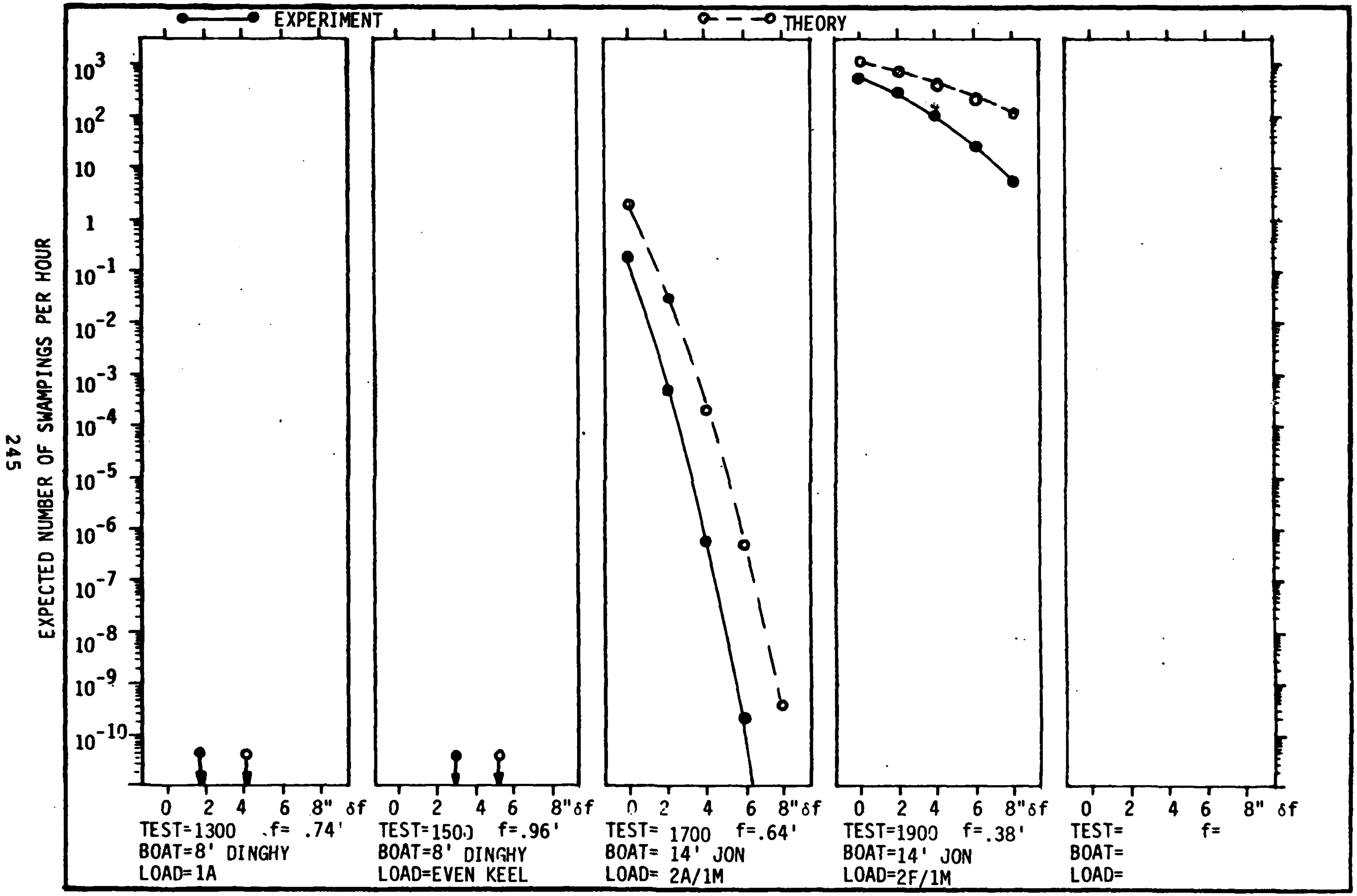

FIG. 57 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 6

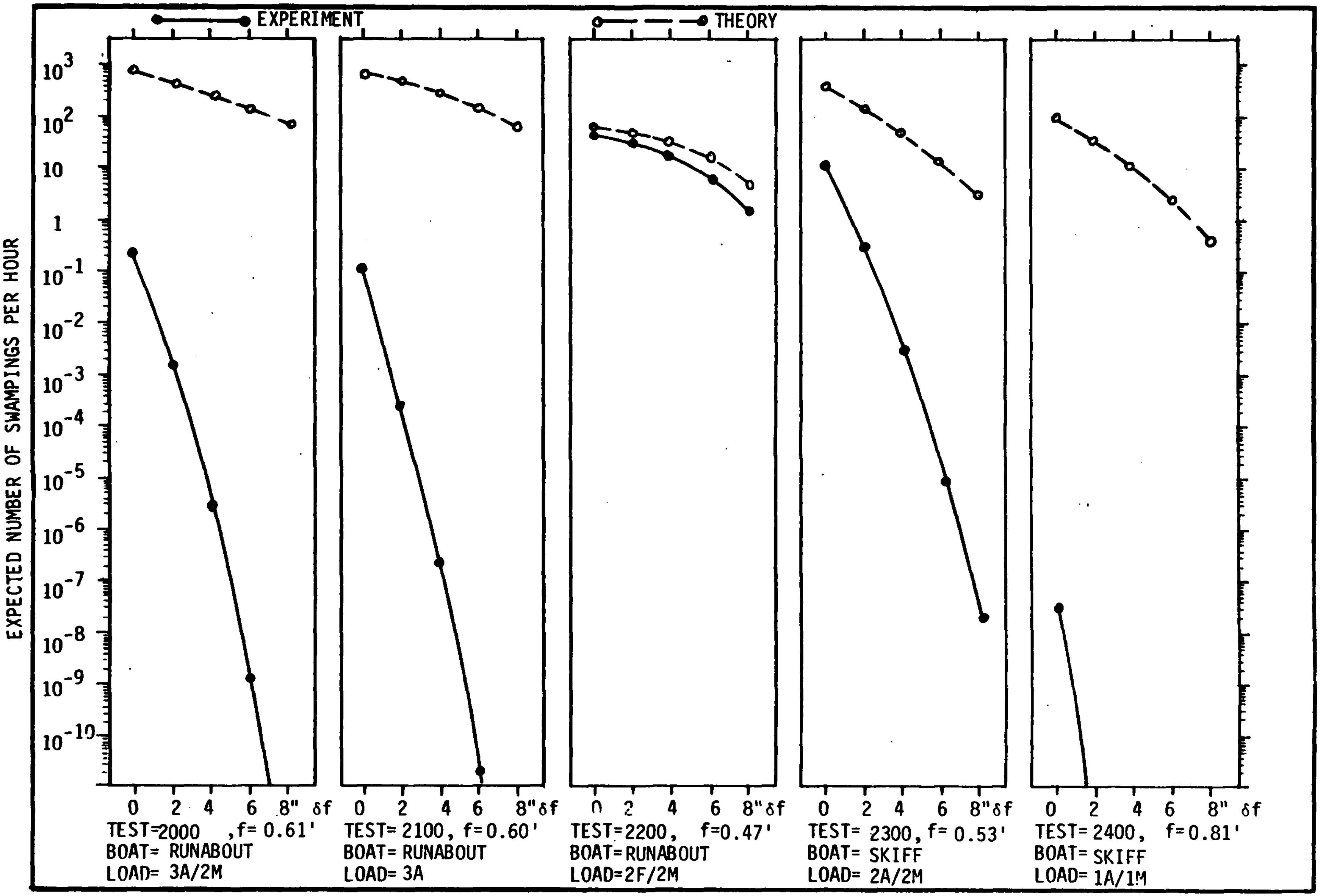

FIG. 57 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 6

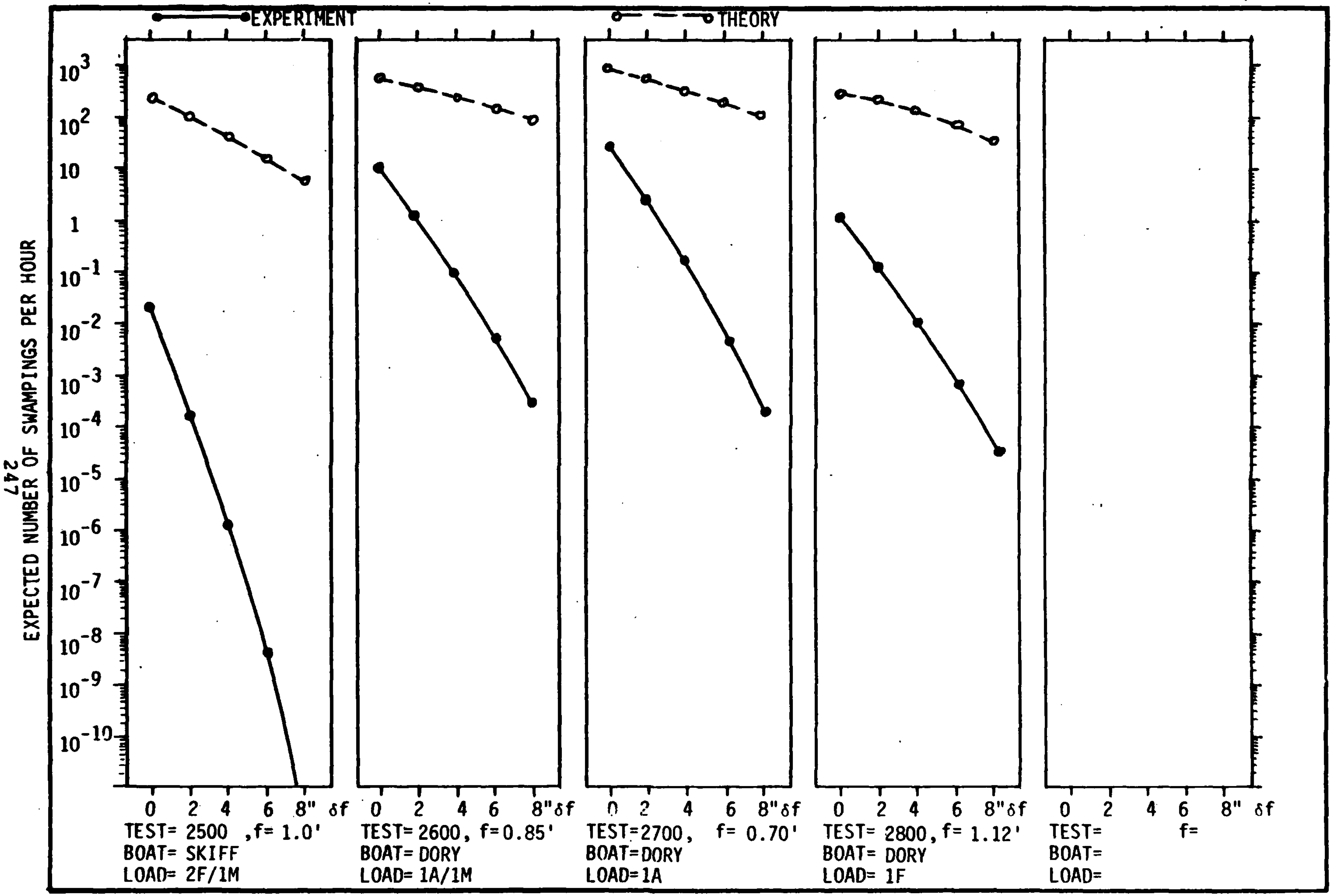

FIG. 57 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 6

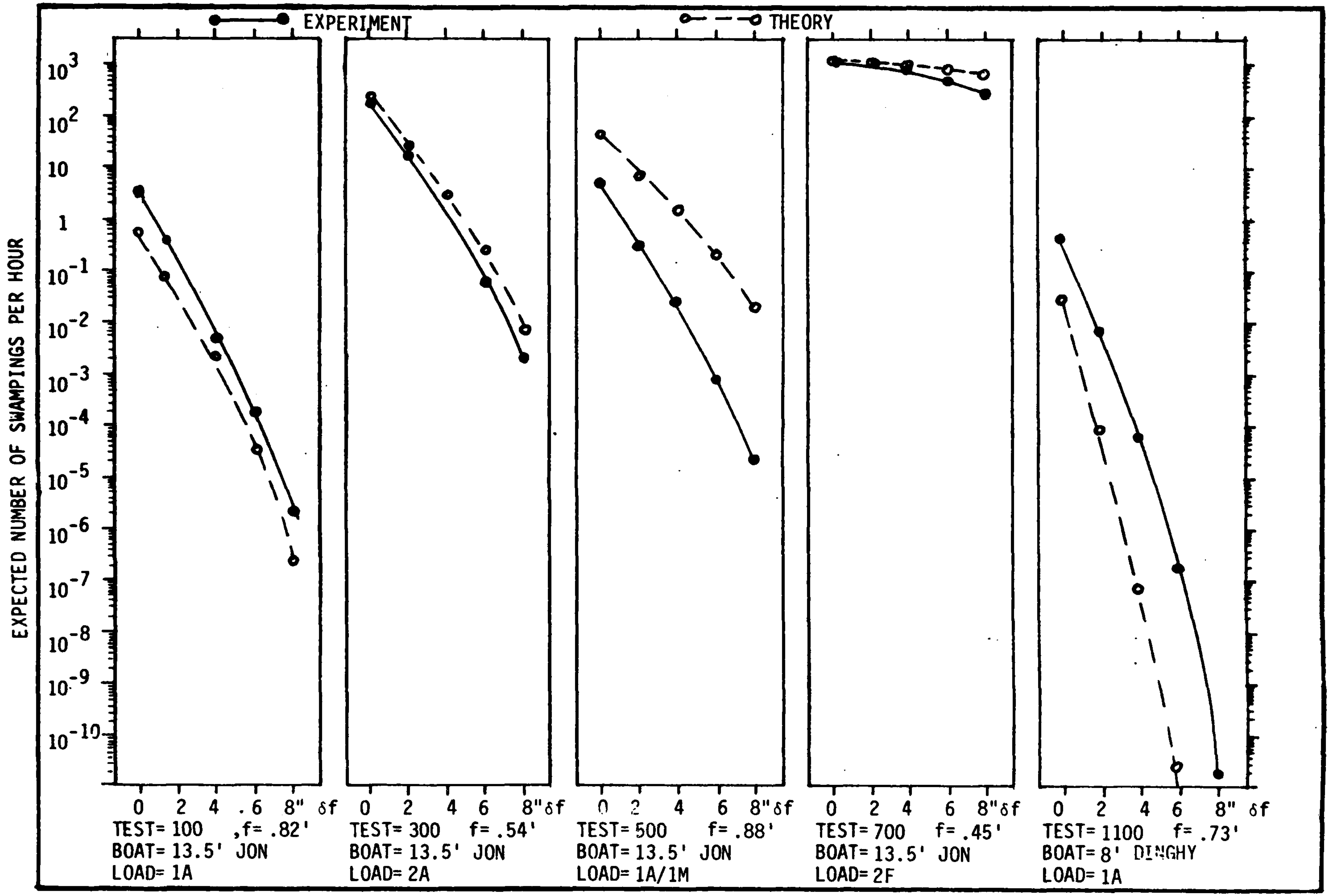

FIG. 58 a. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 7

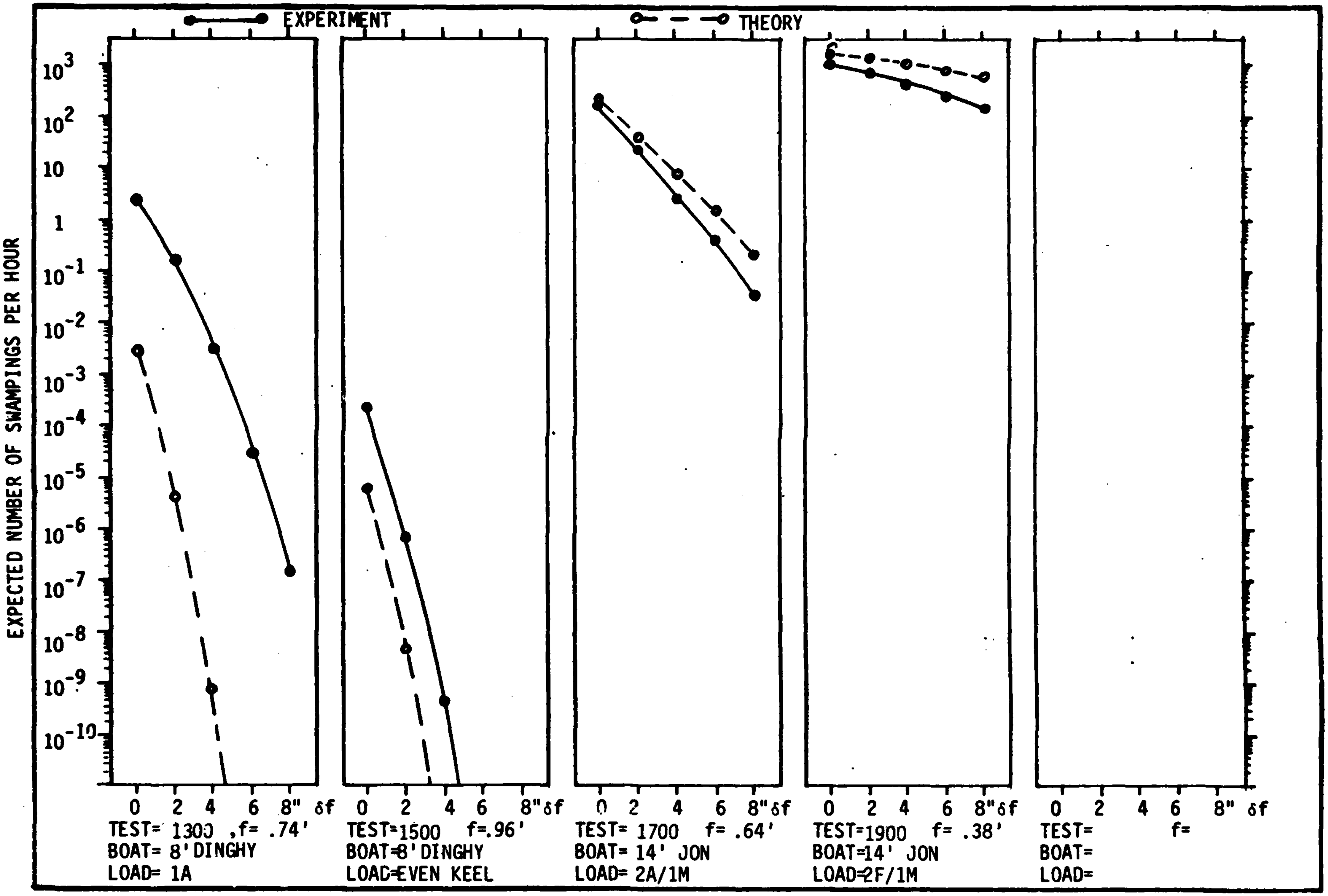

FIG. 58 b. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 7

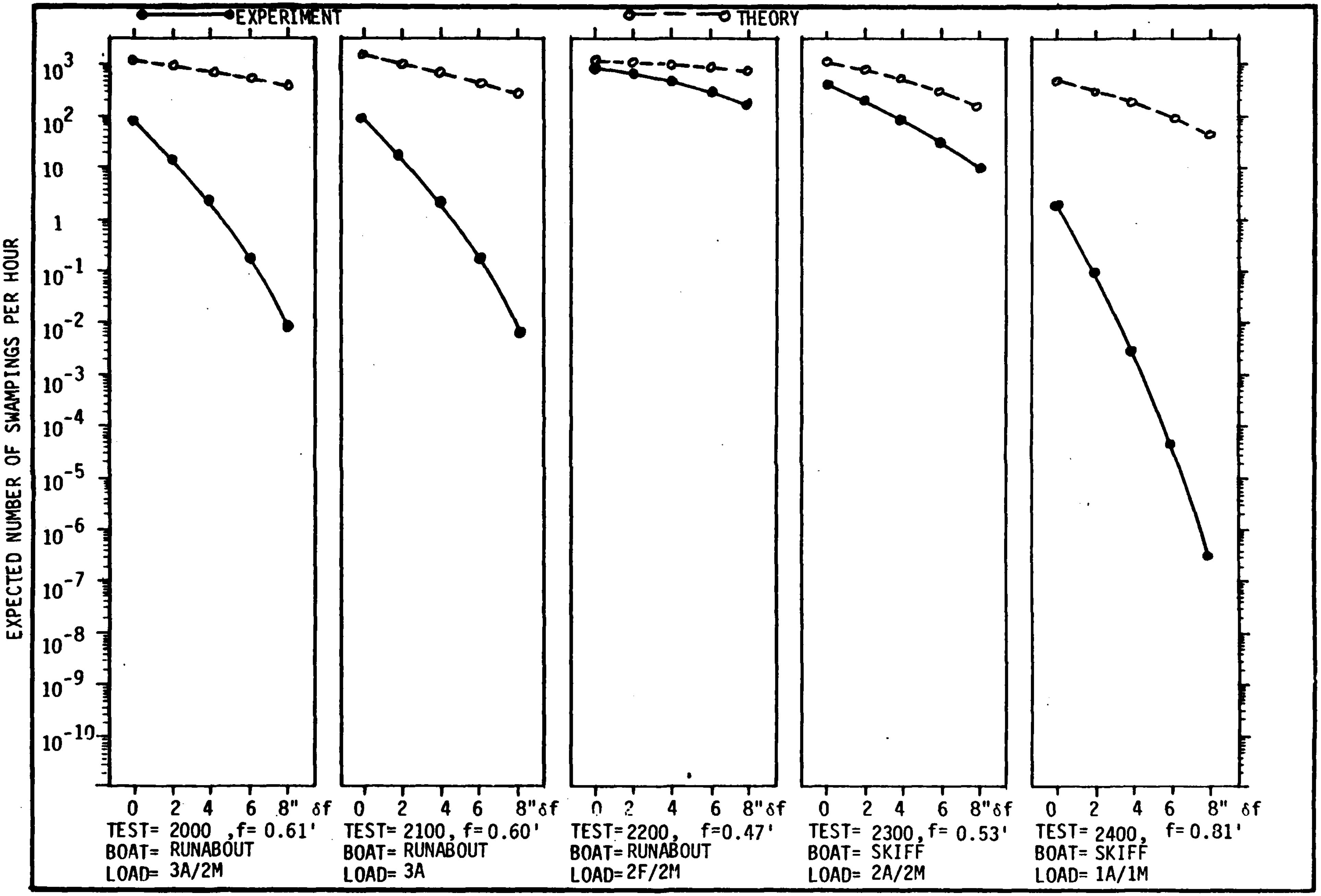

FIG. 58 c. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 7

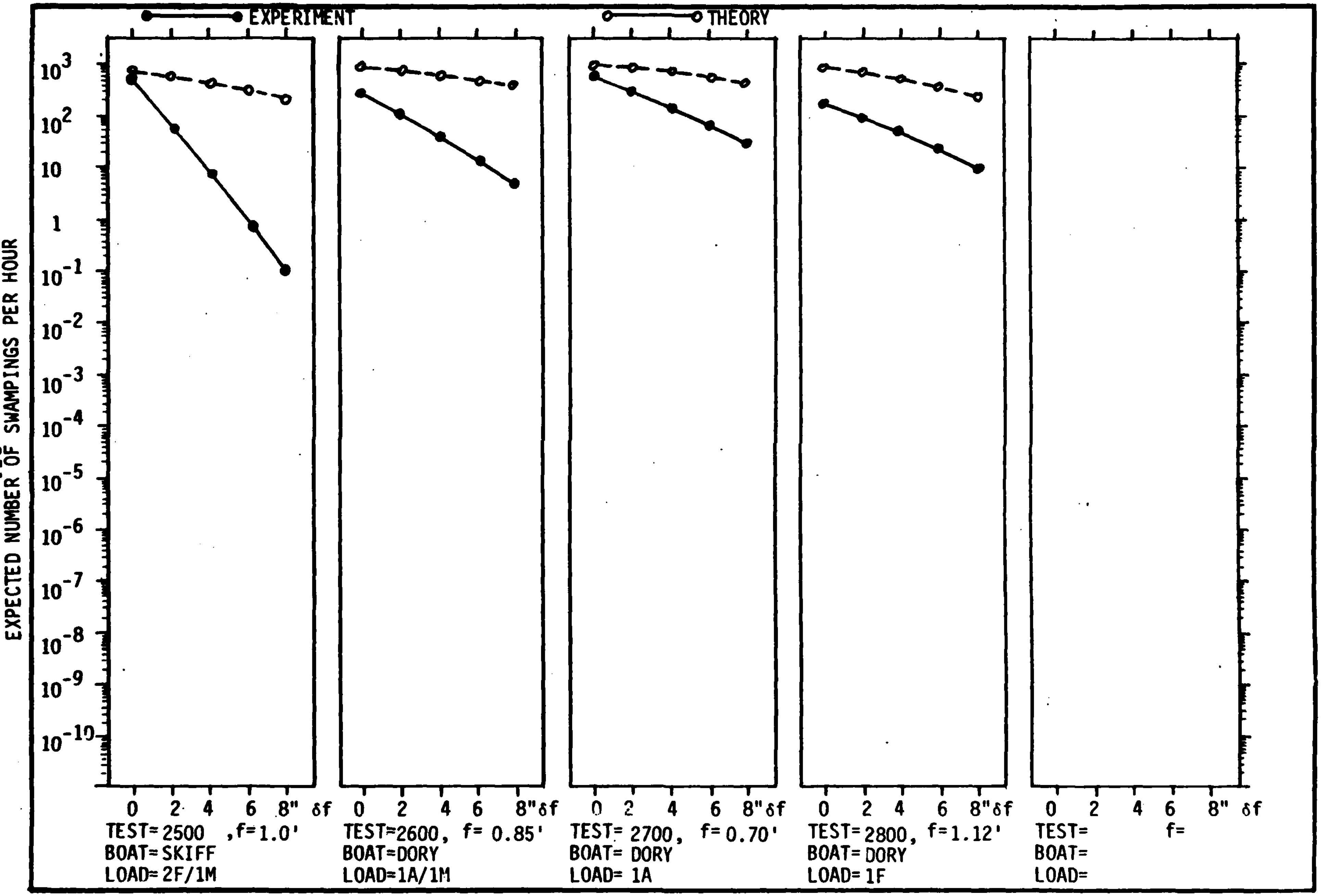

FIG. 58 d. EXPECTED NUMBER OF SWAMPINGS PER HOUR FOR DIFFERENT TEST CONDITIONS. WAVE SPECTRUM = 7

TEST= 100 BOAT=13.5' JON LOAD= 1A ORIGINAL FREEBOARD= 0.82'

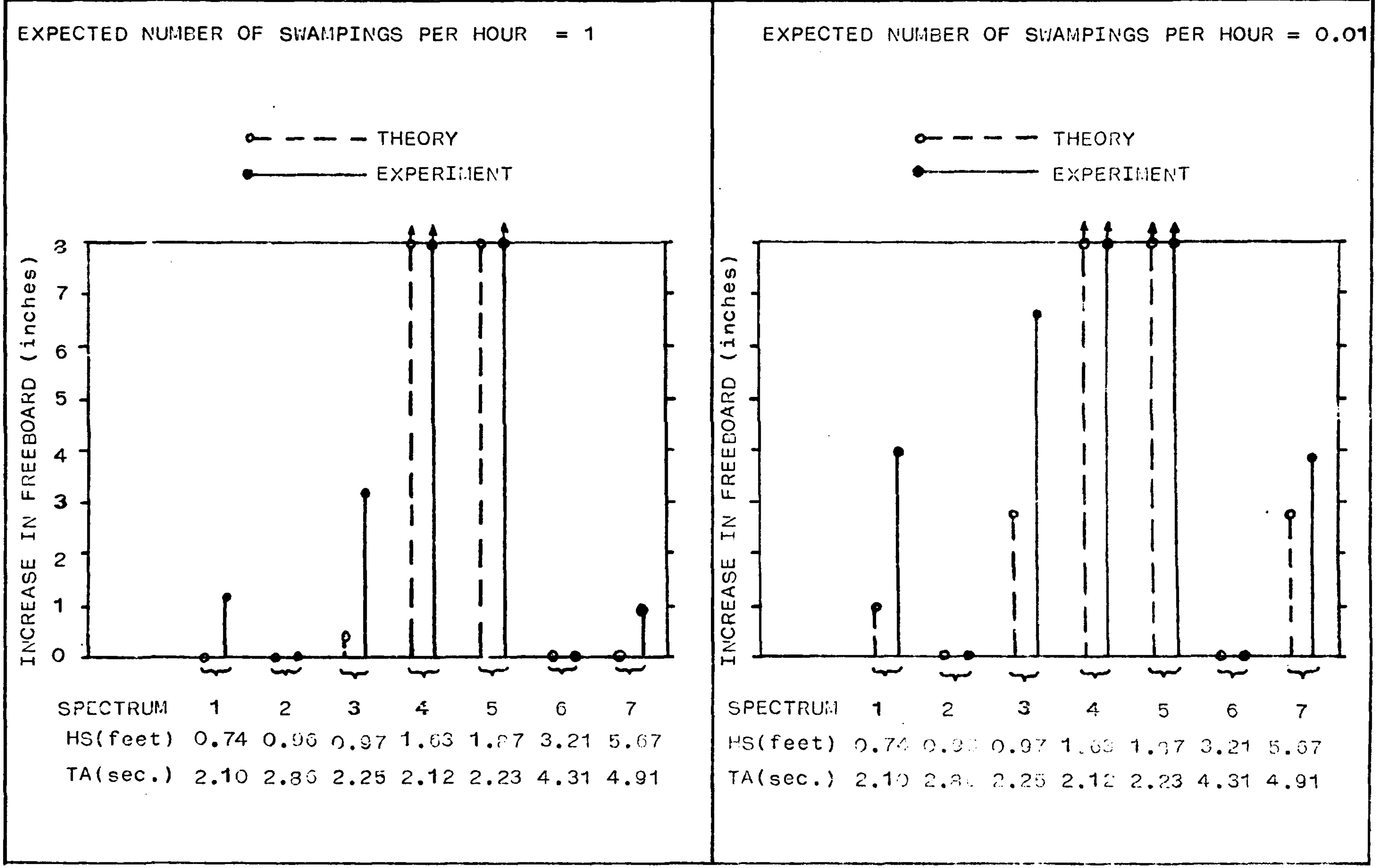

FIG.59. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

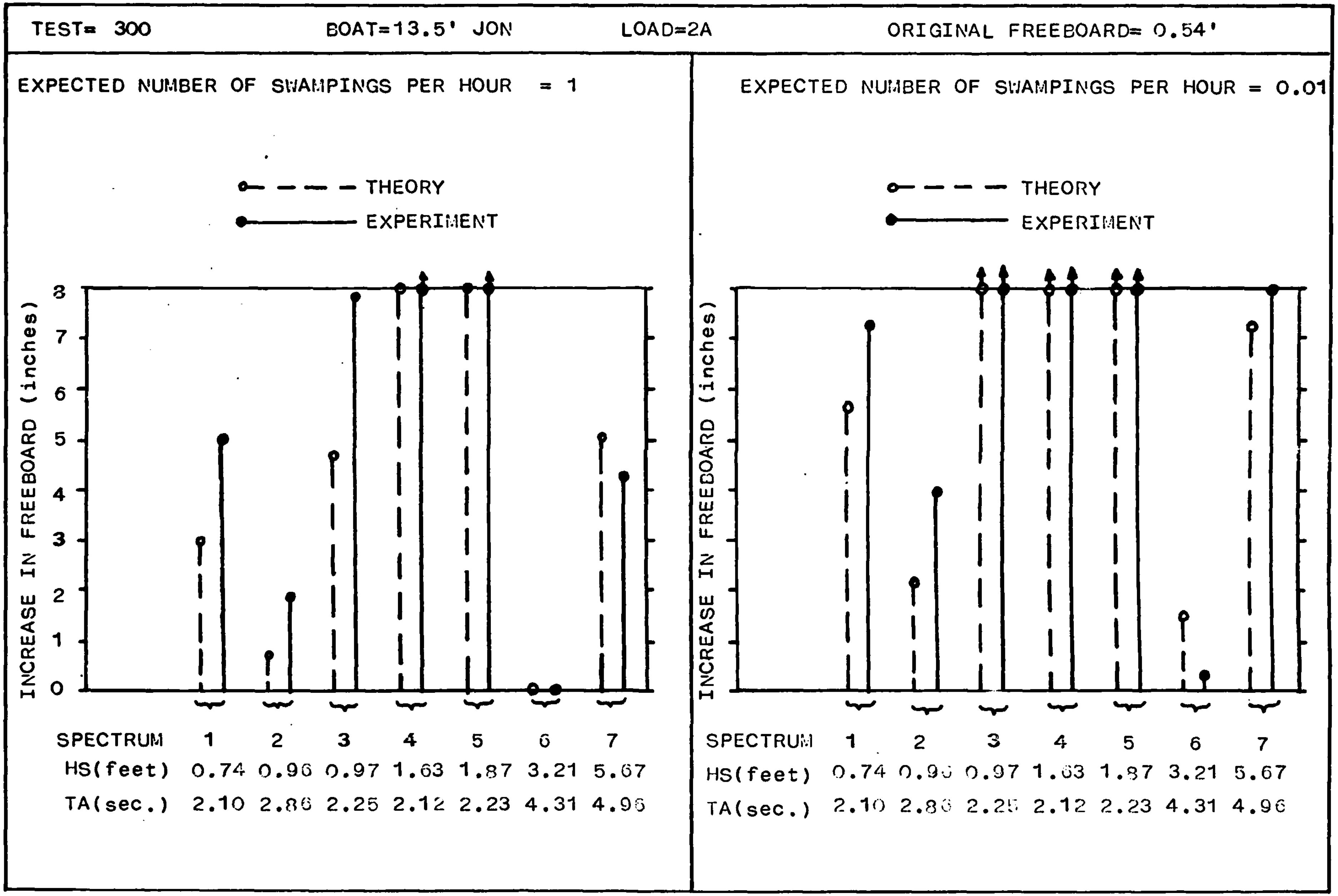

FIG. 60. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

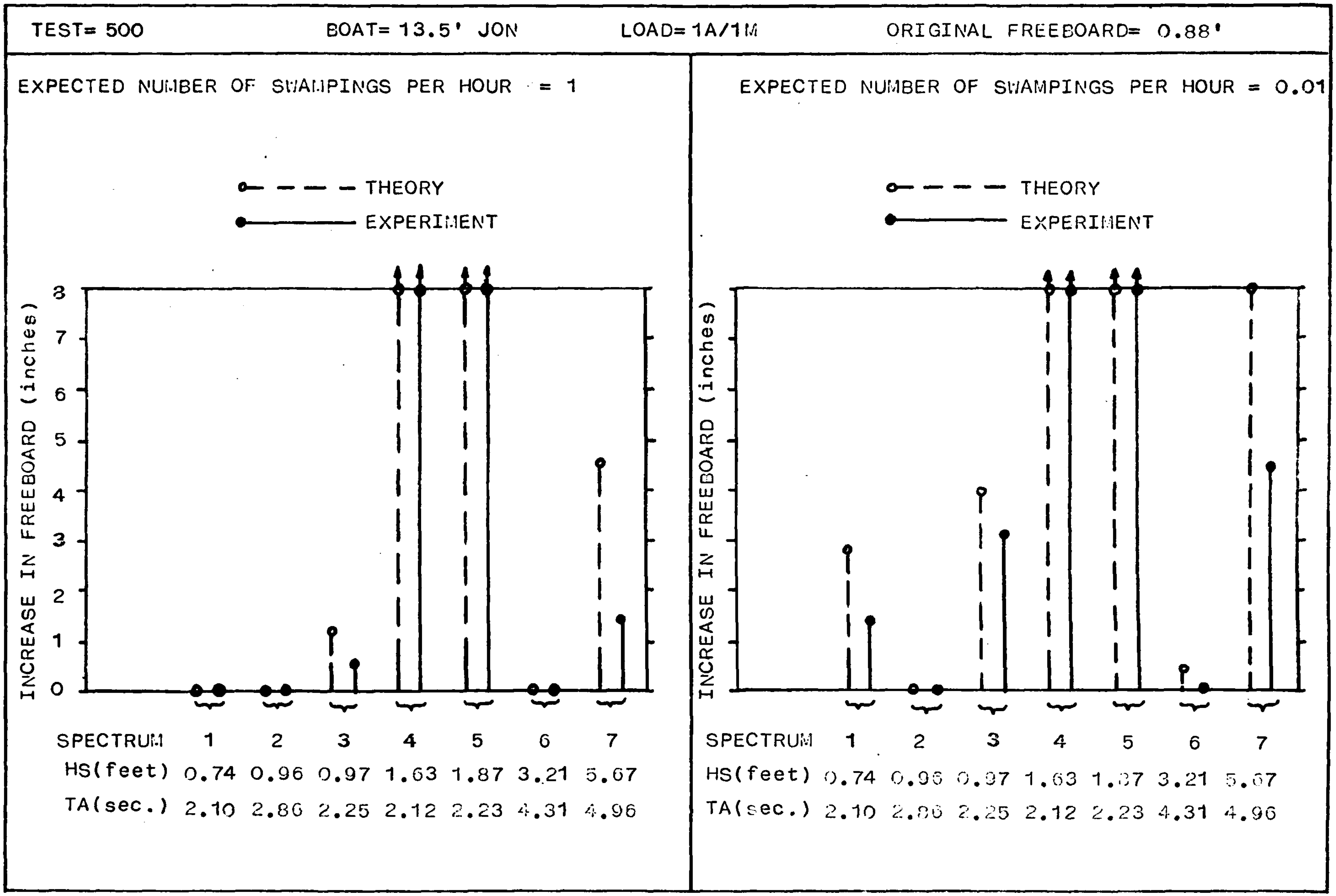

FIG. 61.INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

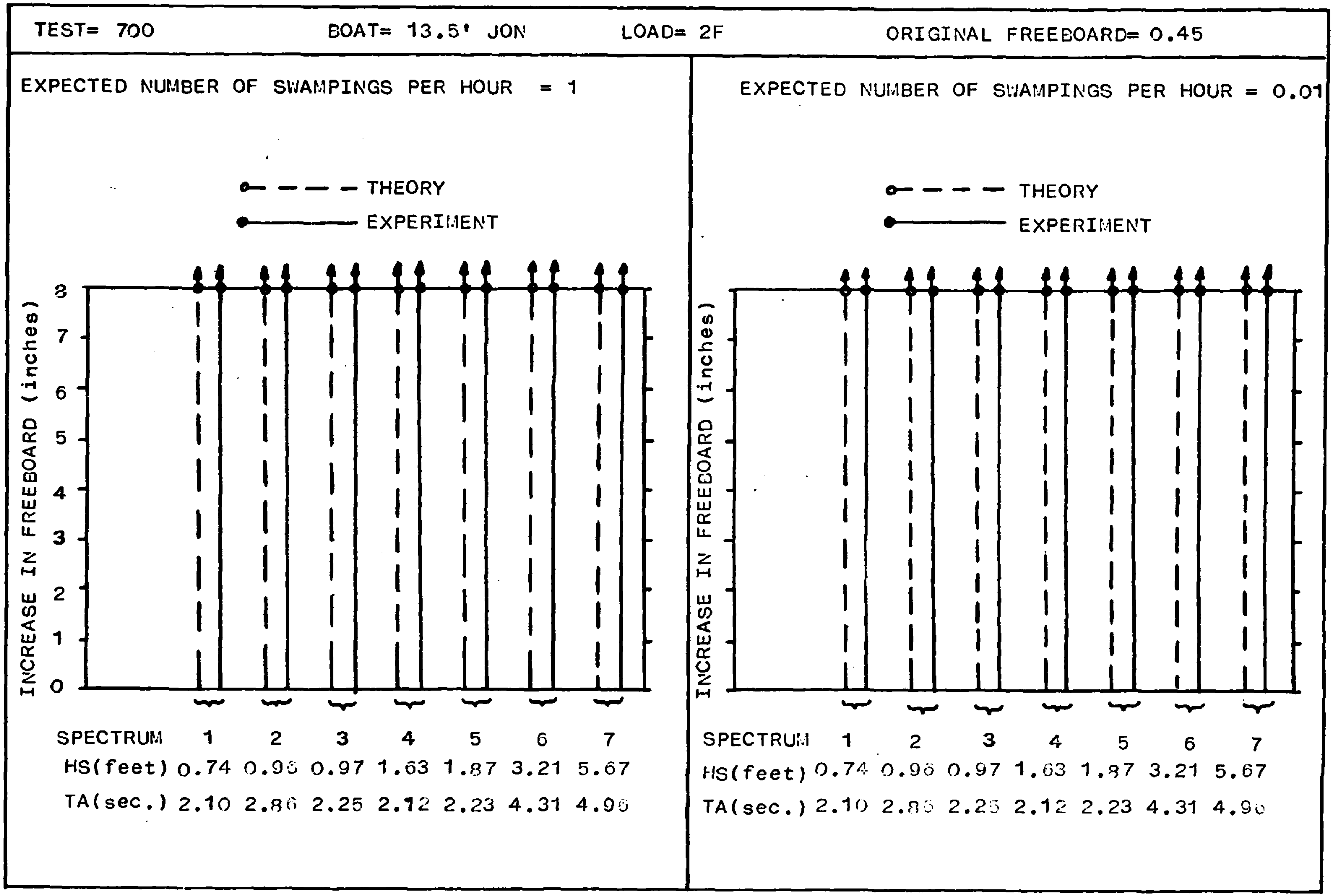

FIG.62. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

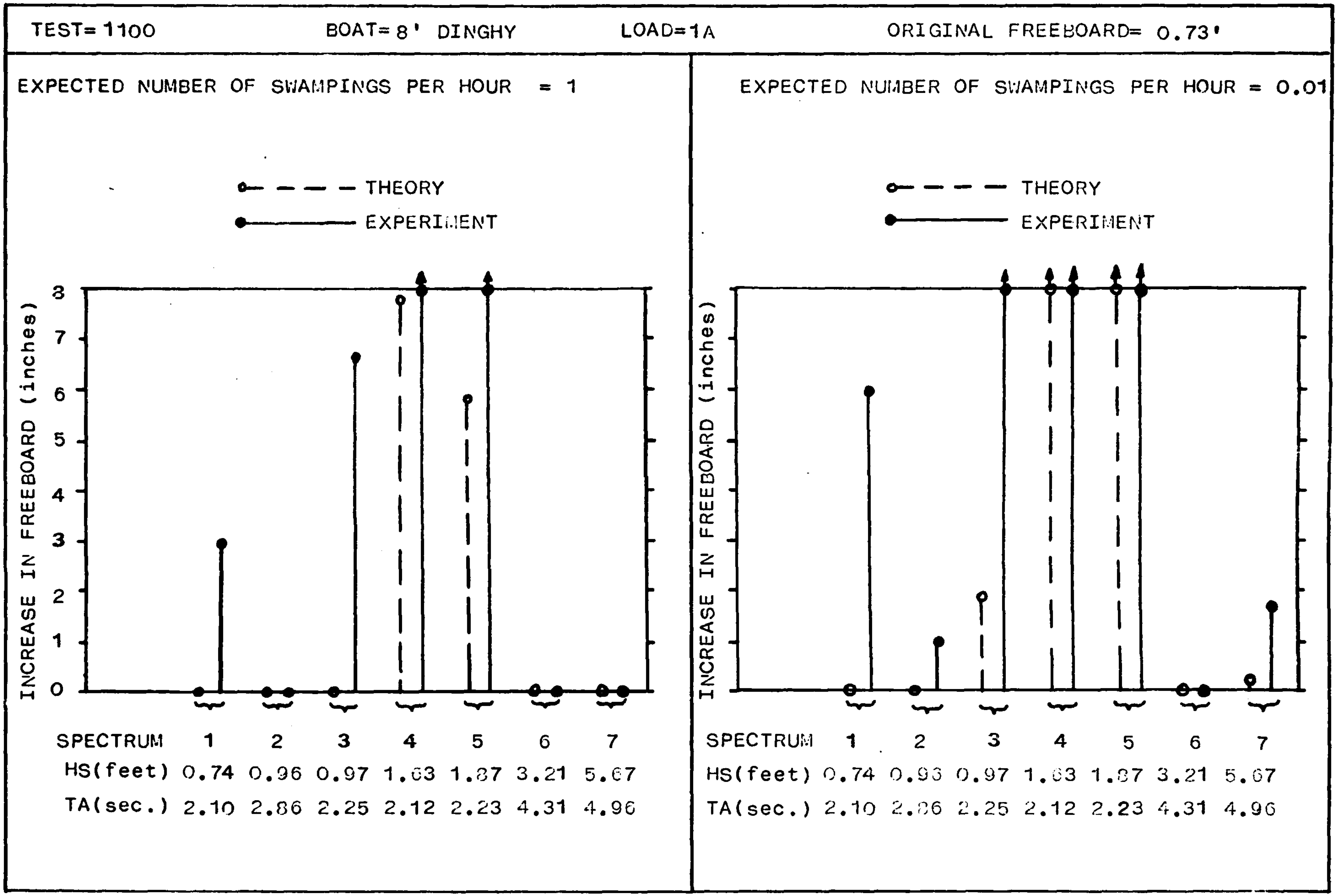

FIG. 63. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

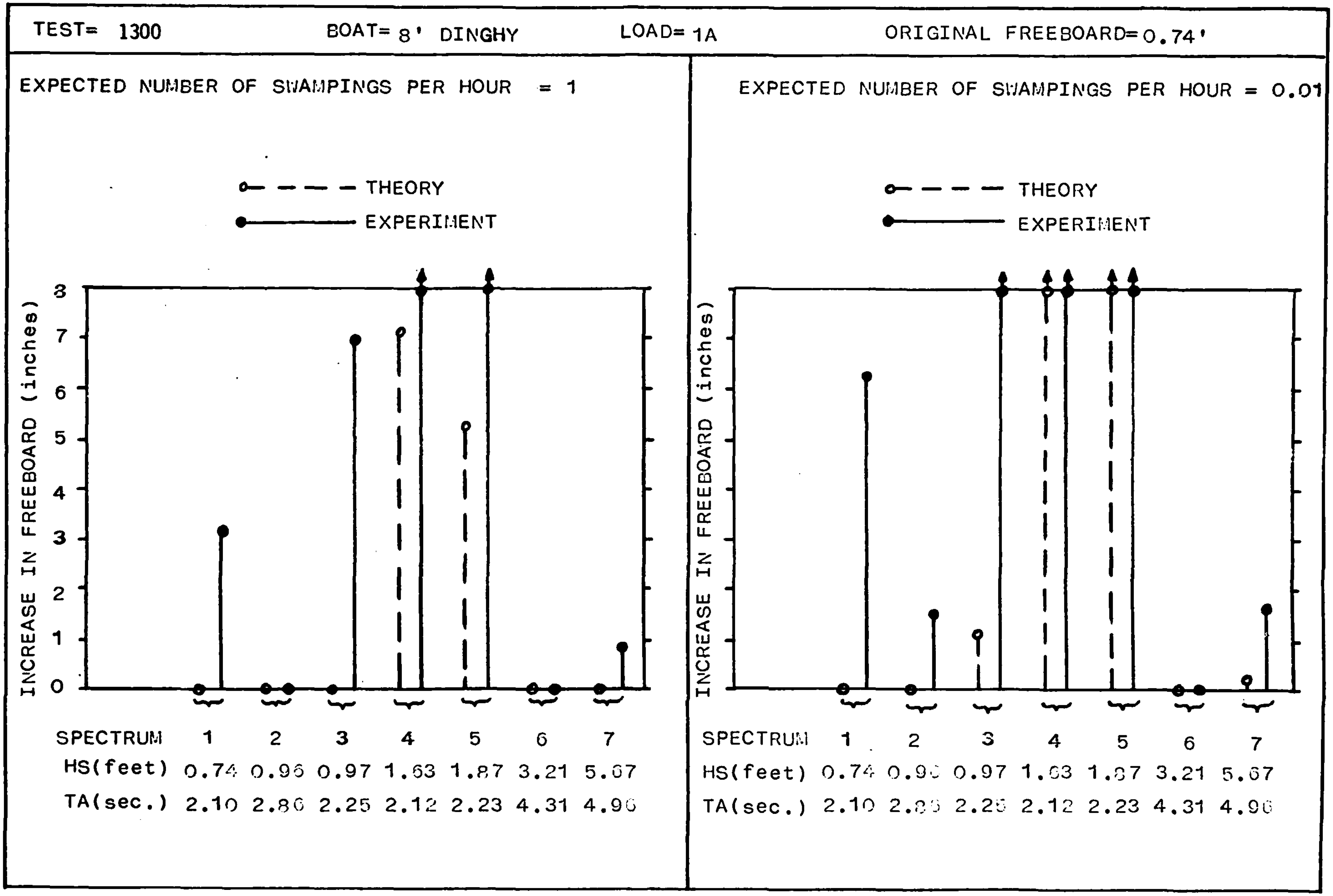

FIG. 64. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

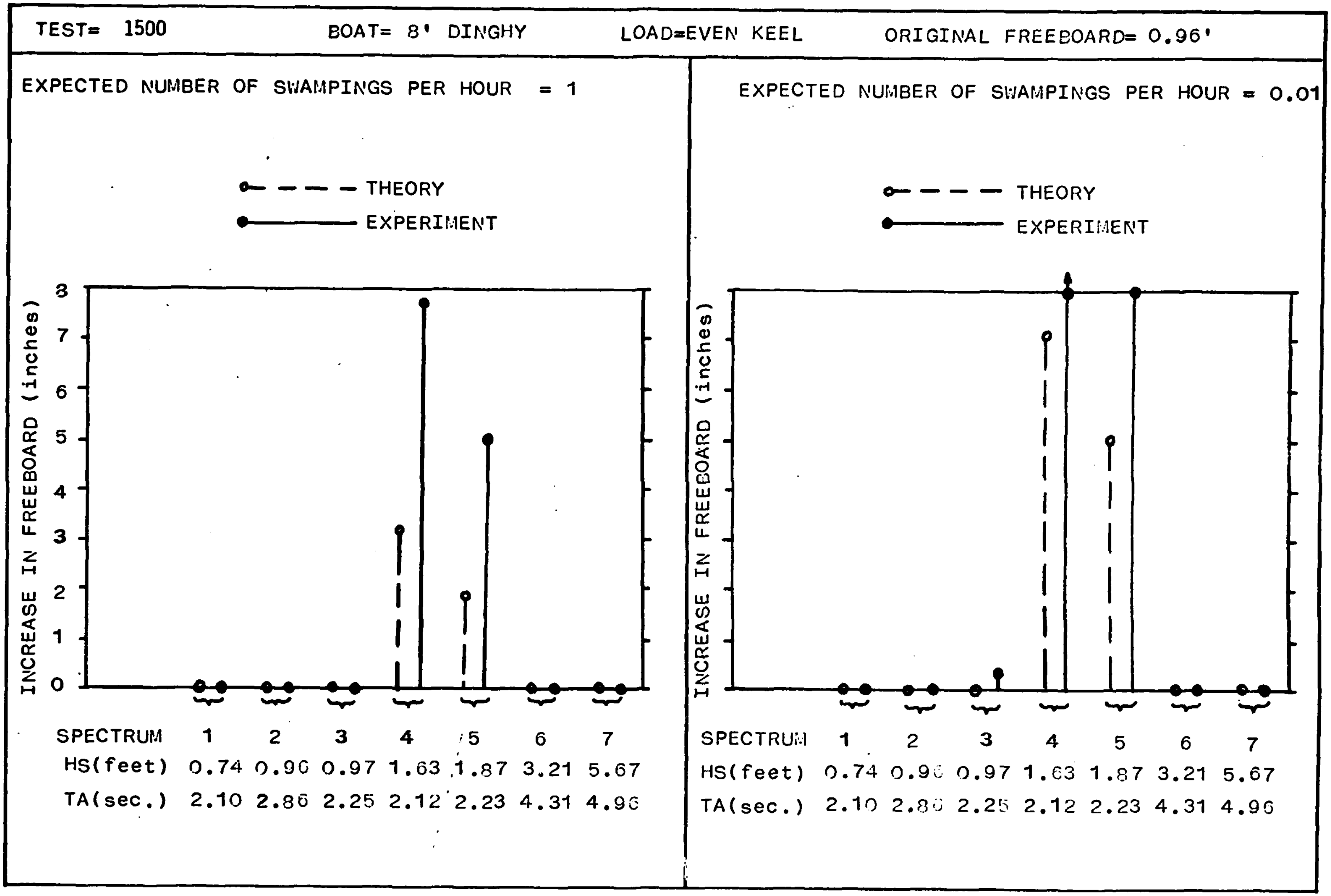

FIG. 65. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

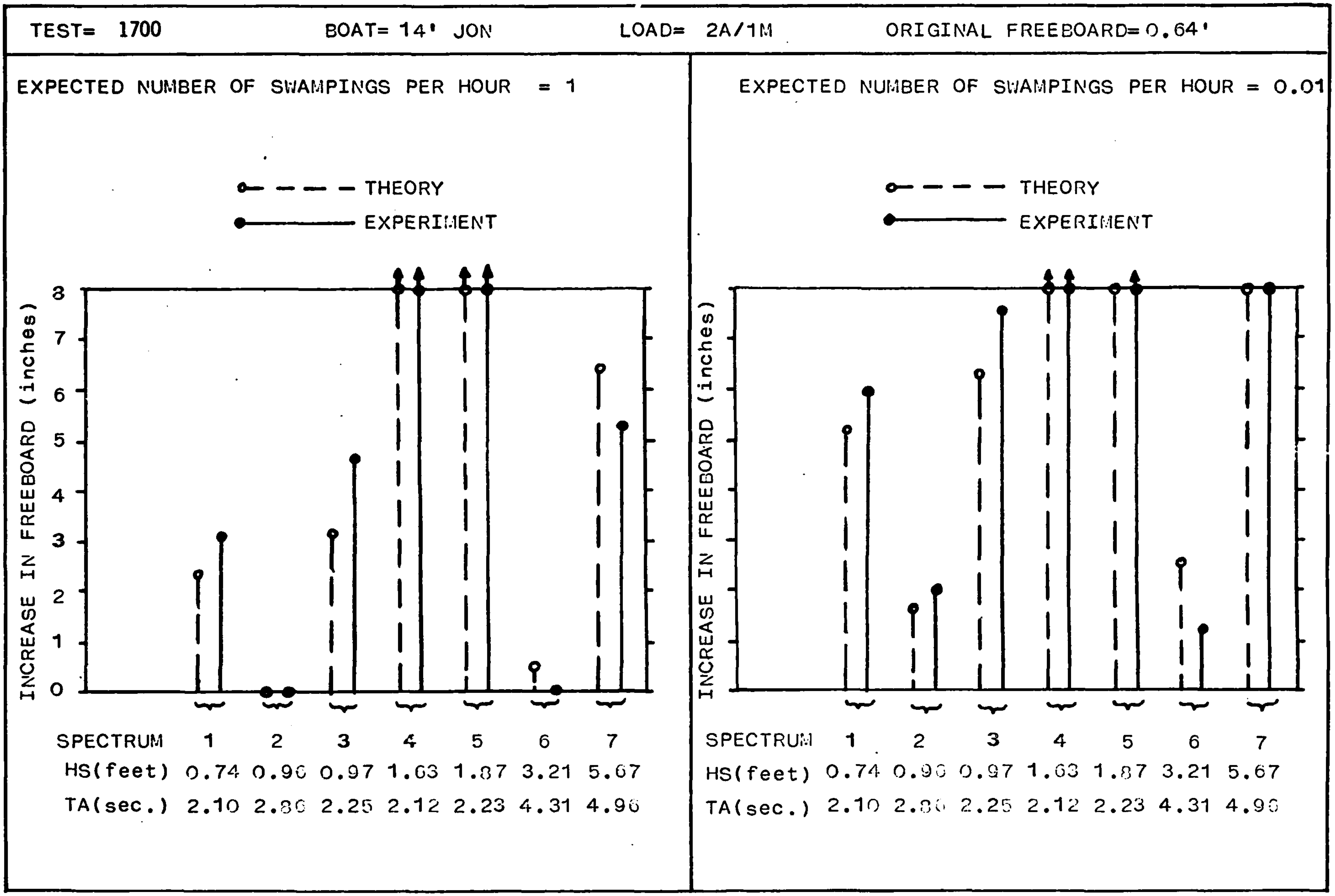

FIG. 66. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

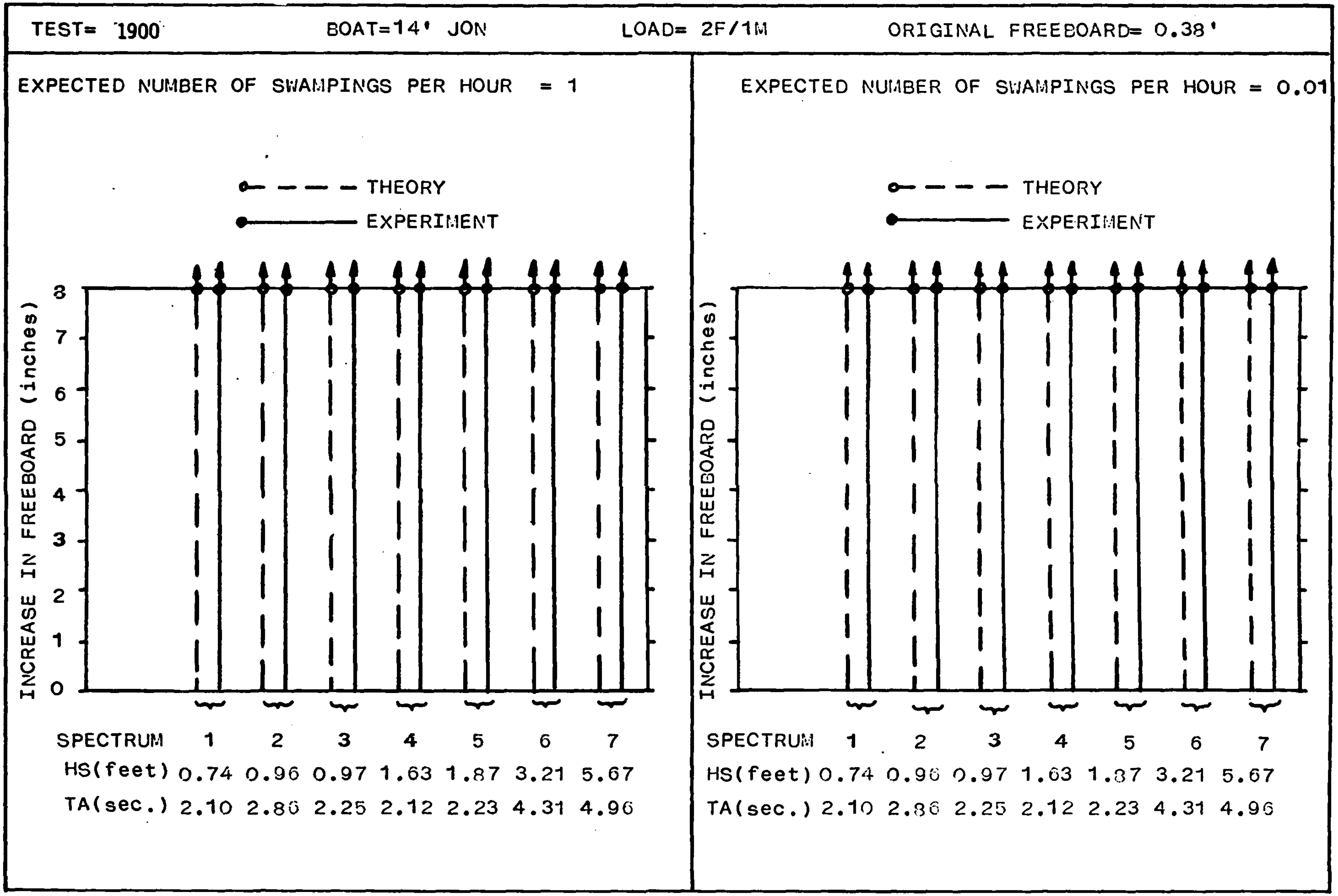

FIG.67. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

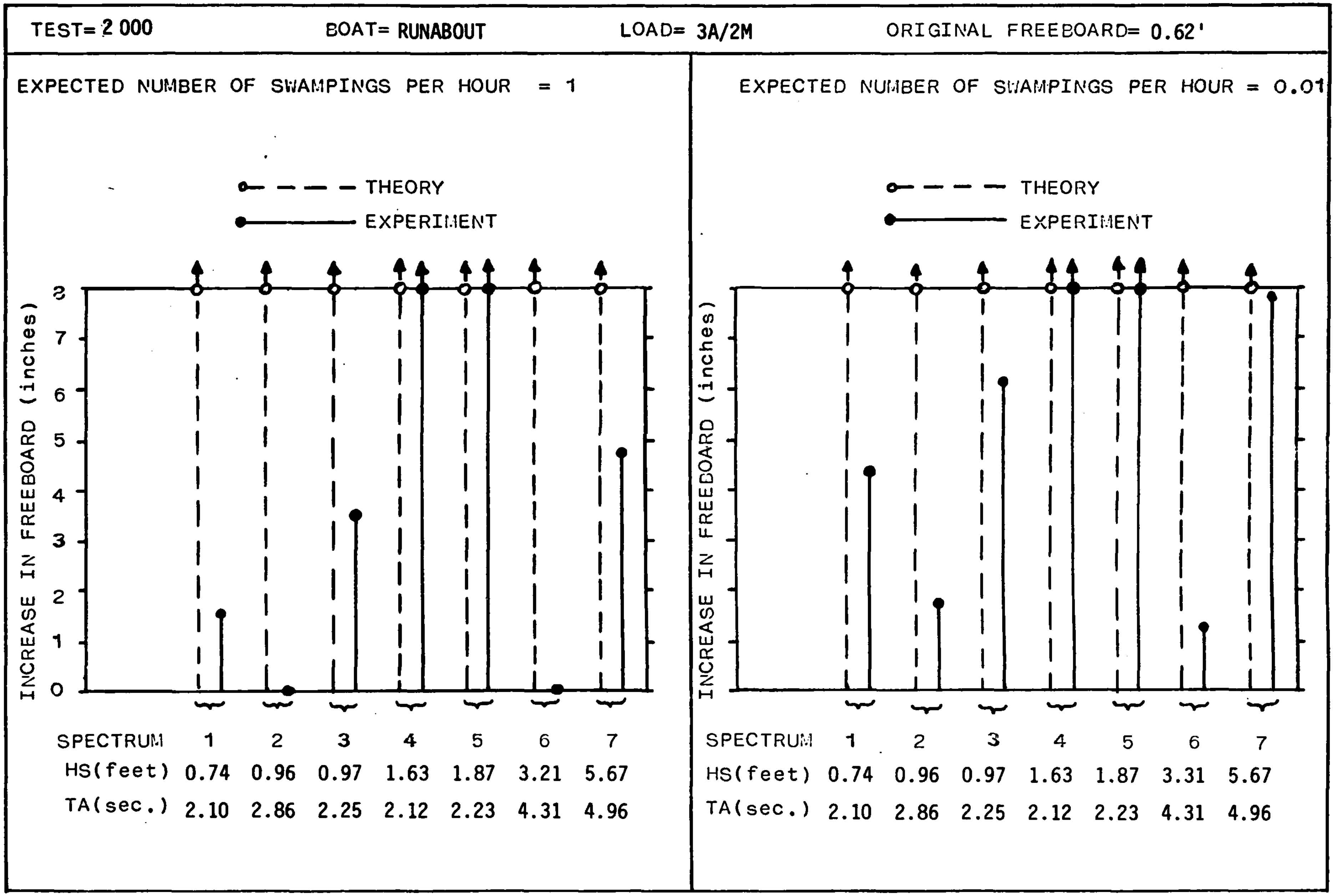

FIG. 68.INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

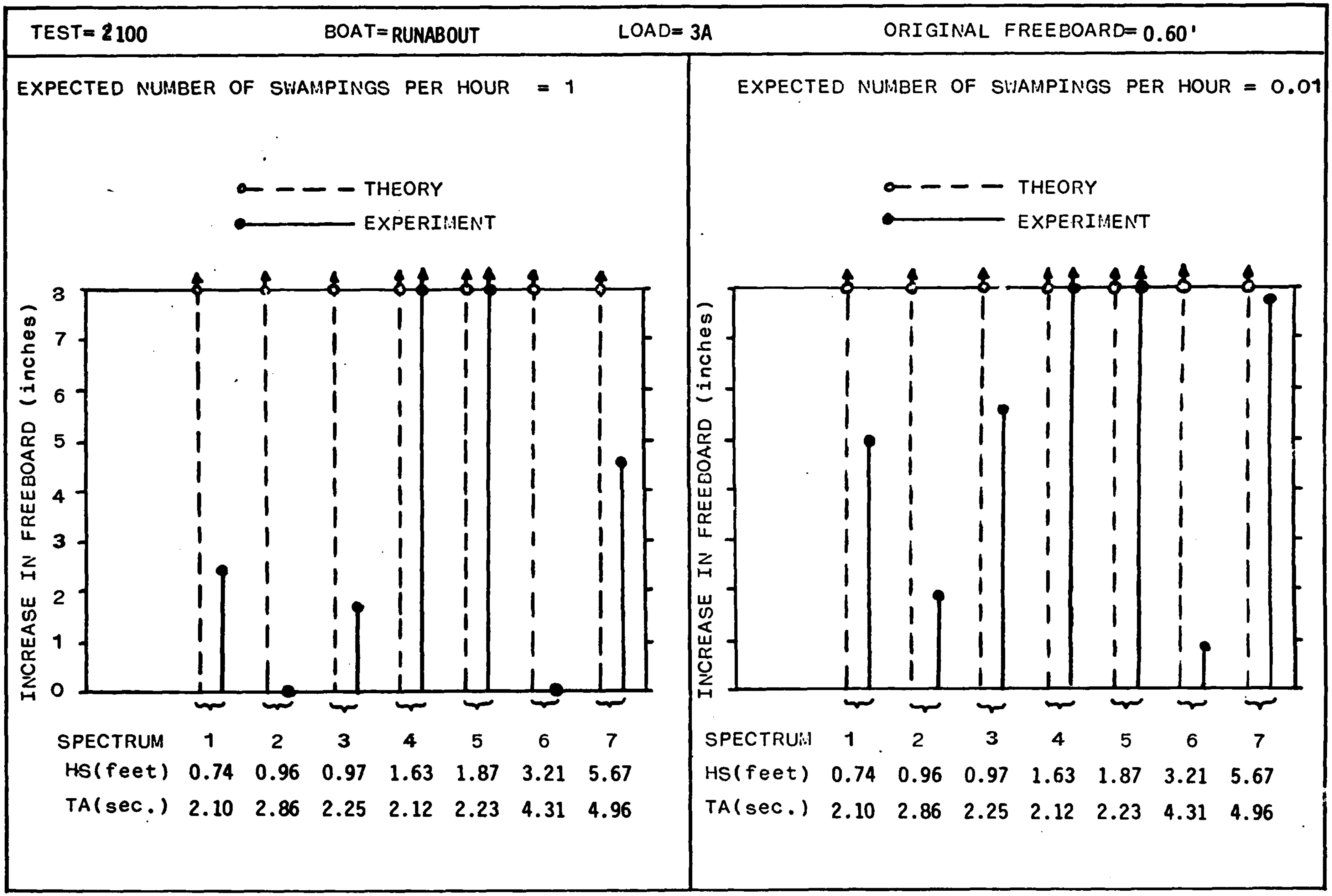

FIG. 69. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

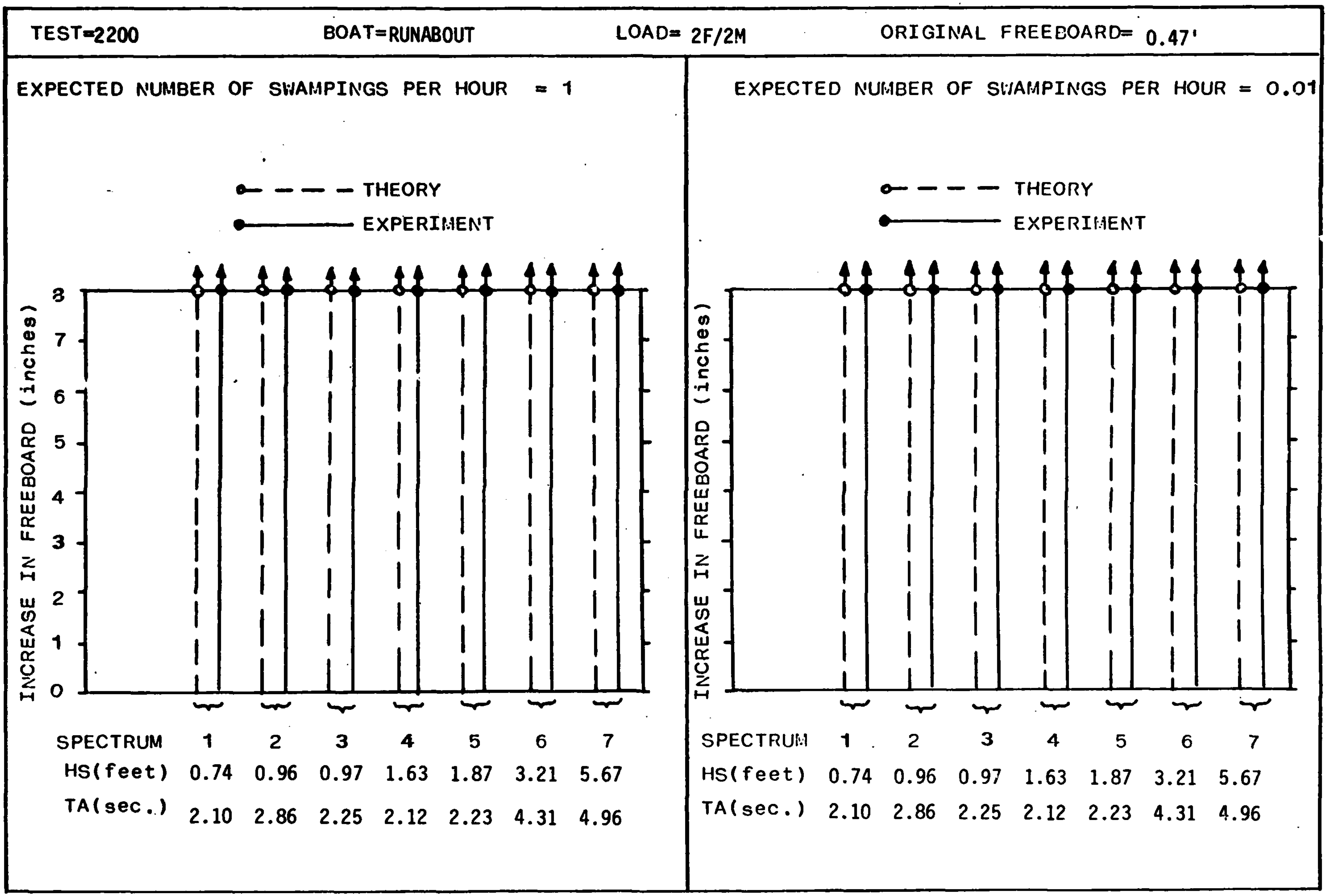

FIG.70. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

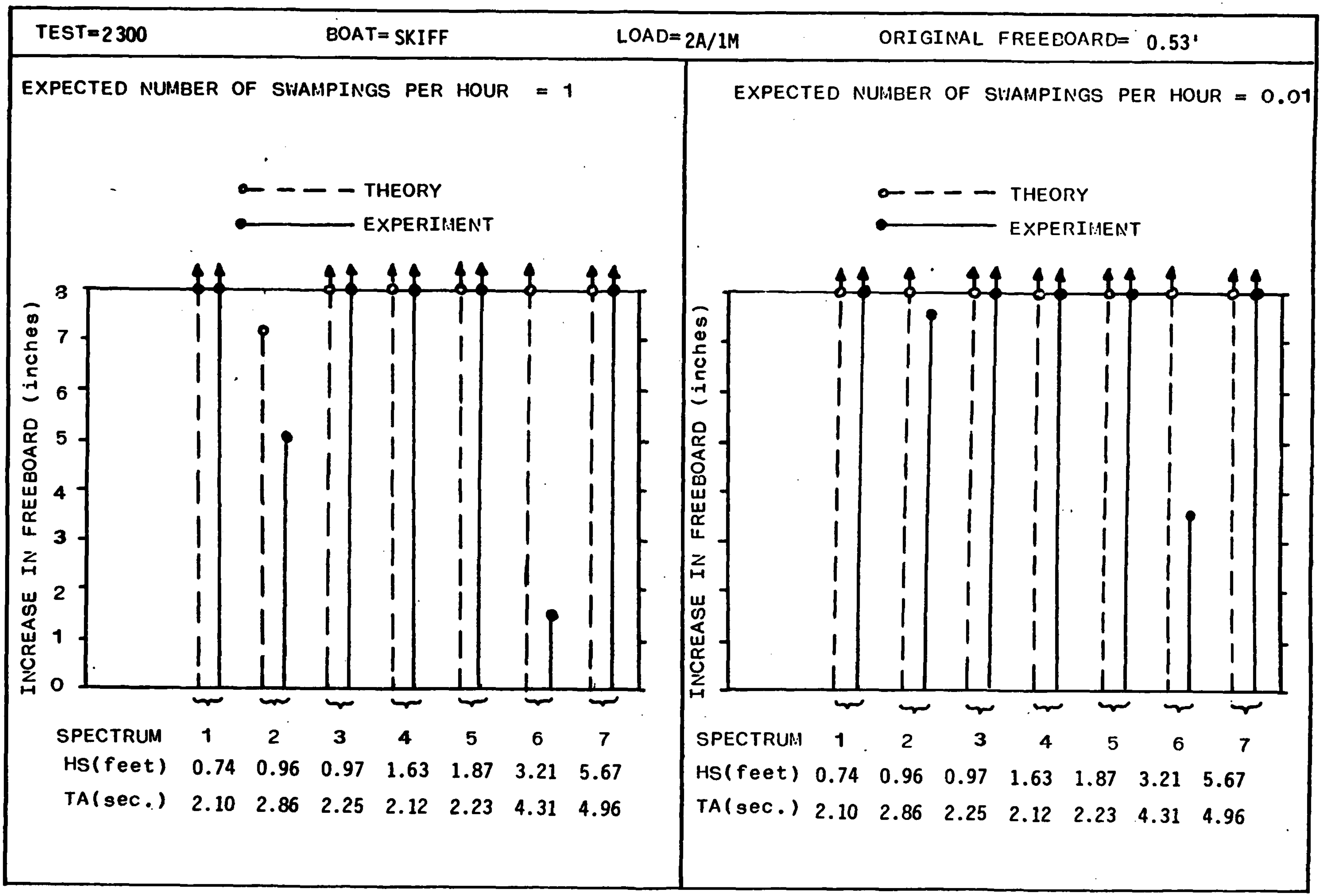

FIG.71. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

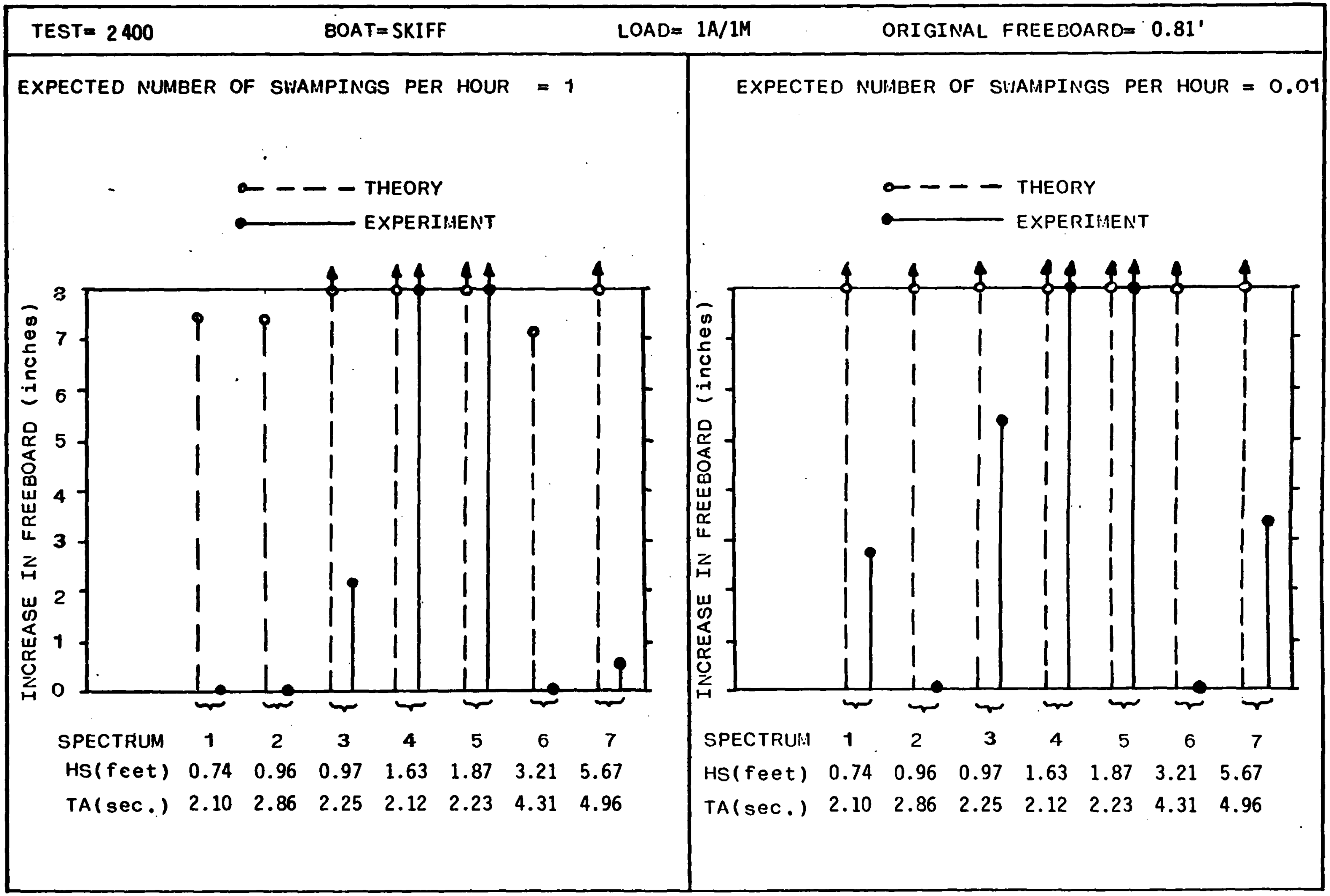

FIG. 72. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

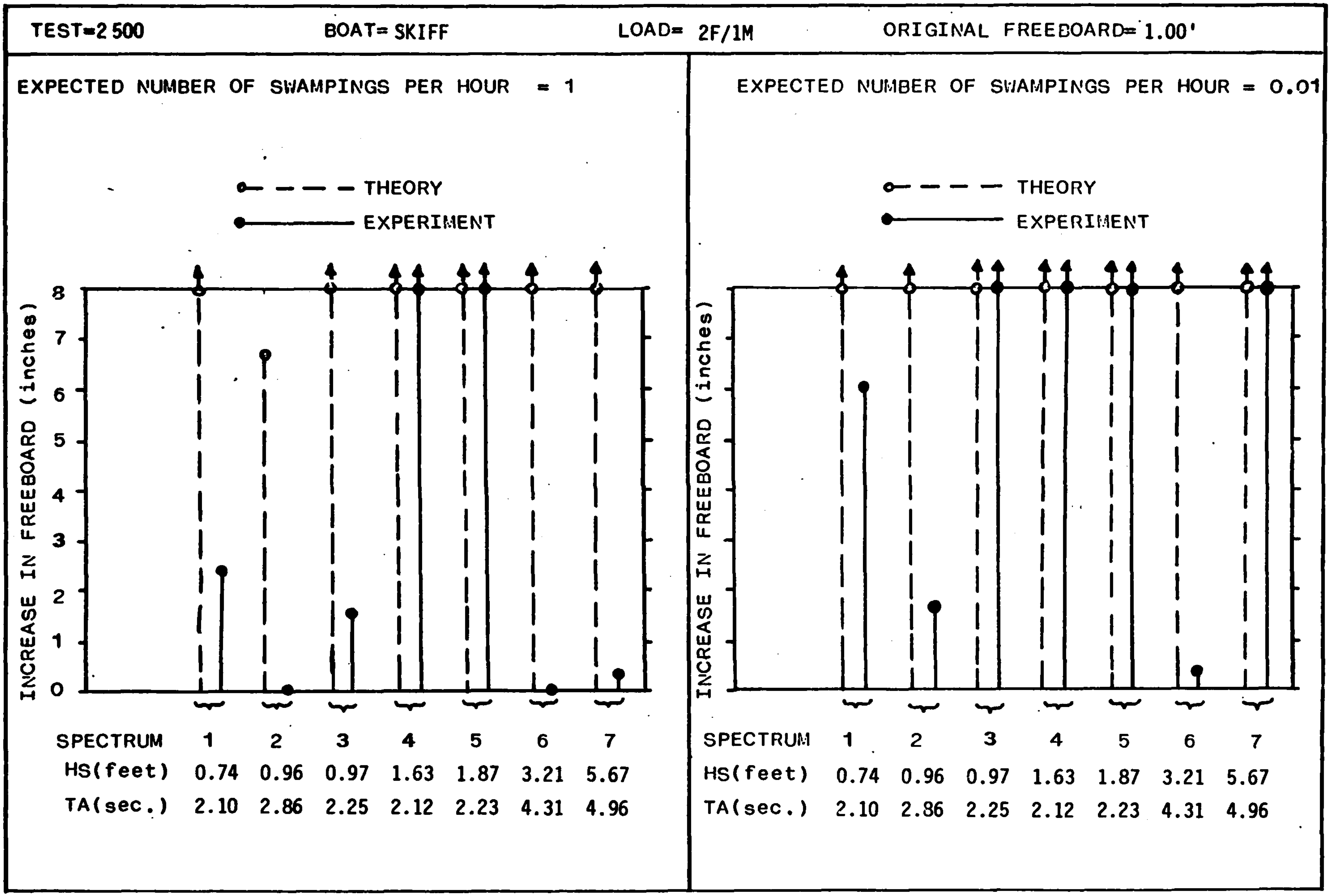

FIG. 73. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

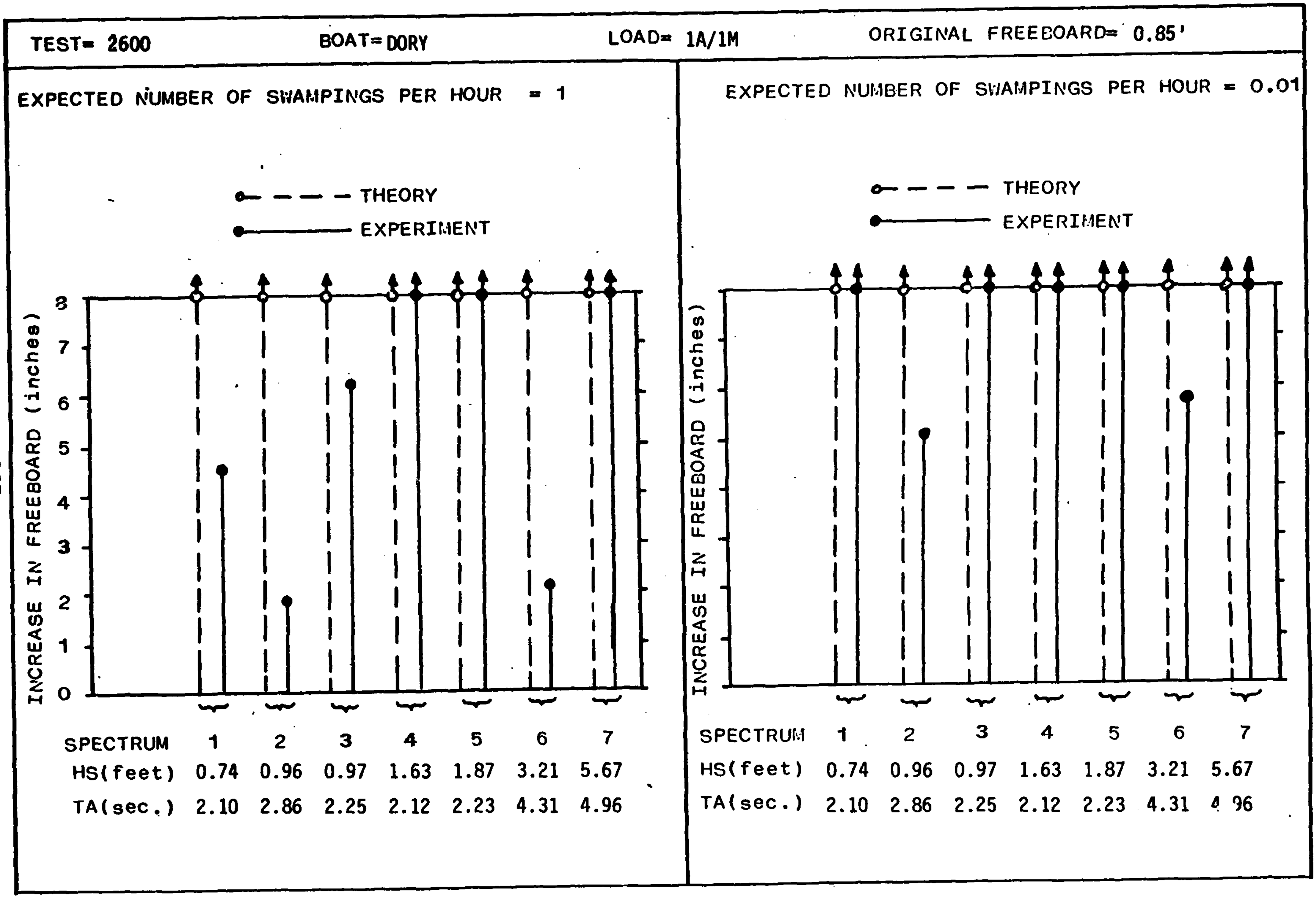

FIG. 74. INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

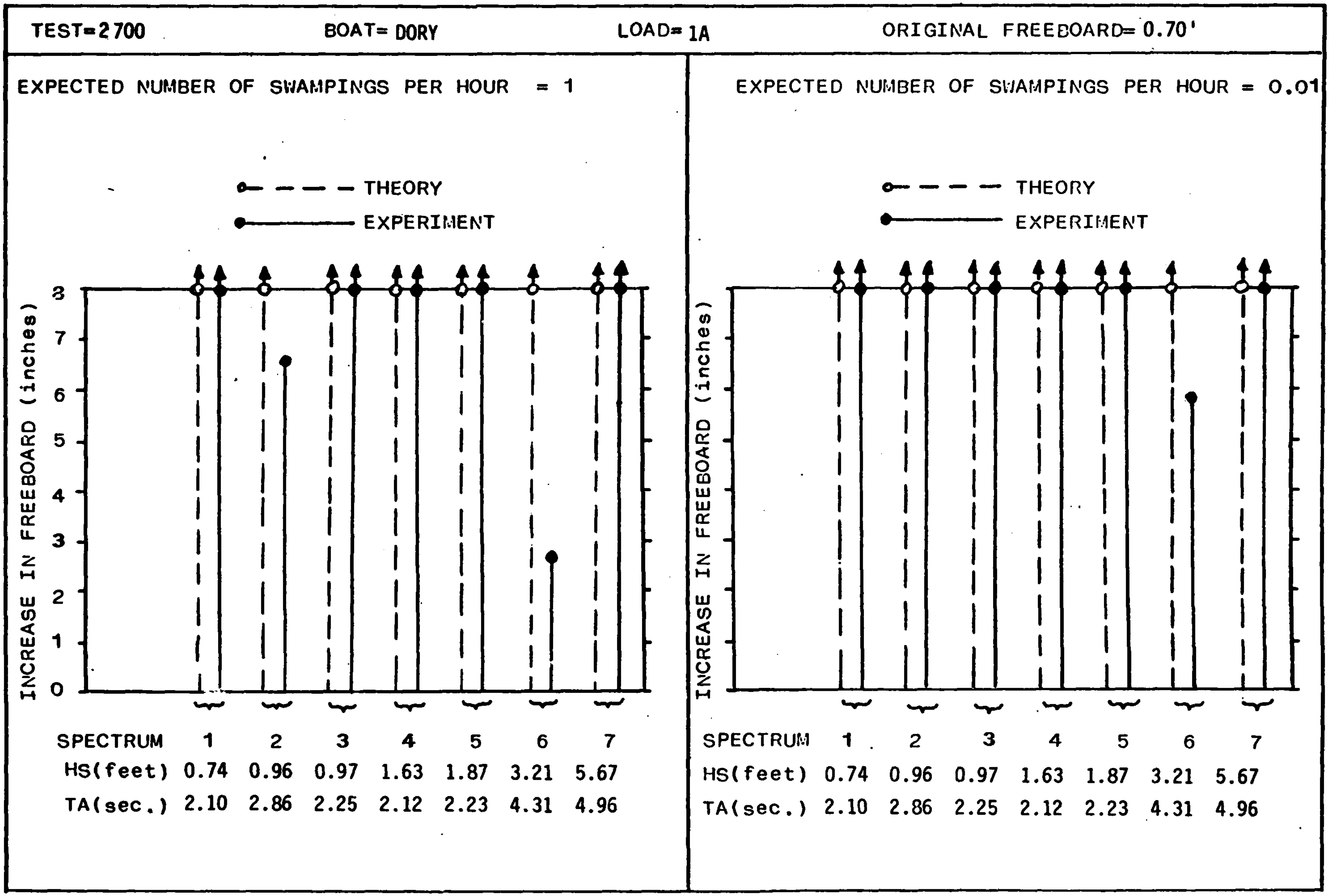

FIG. 75.INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

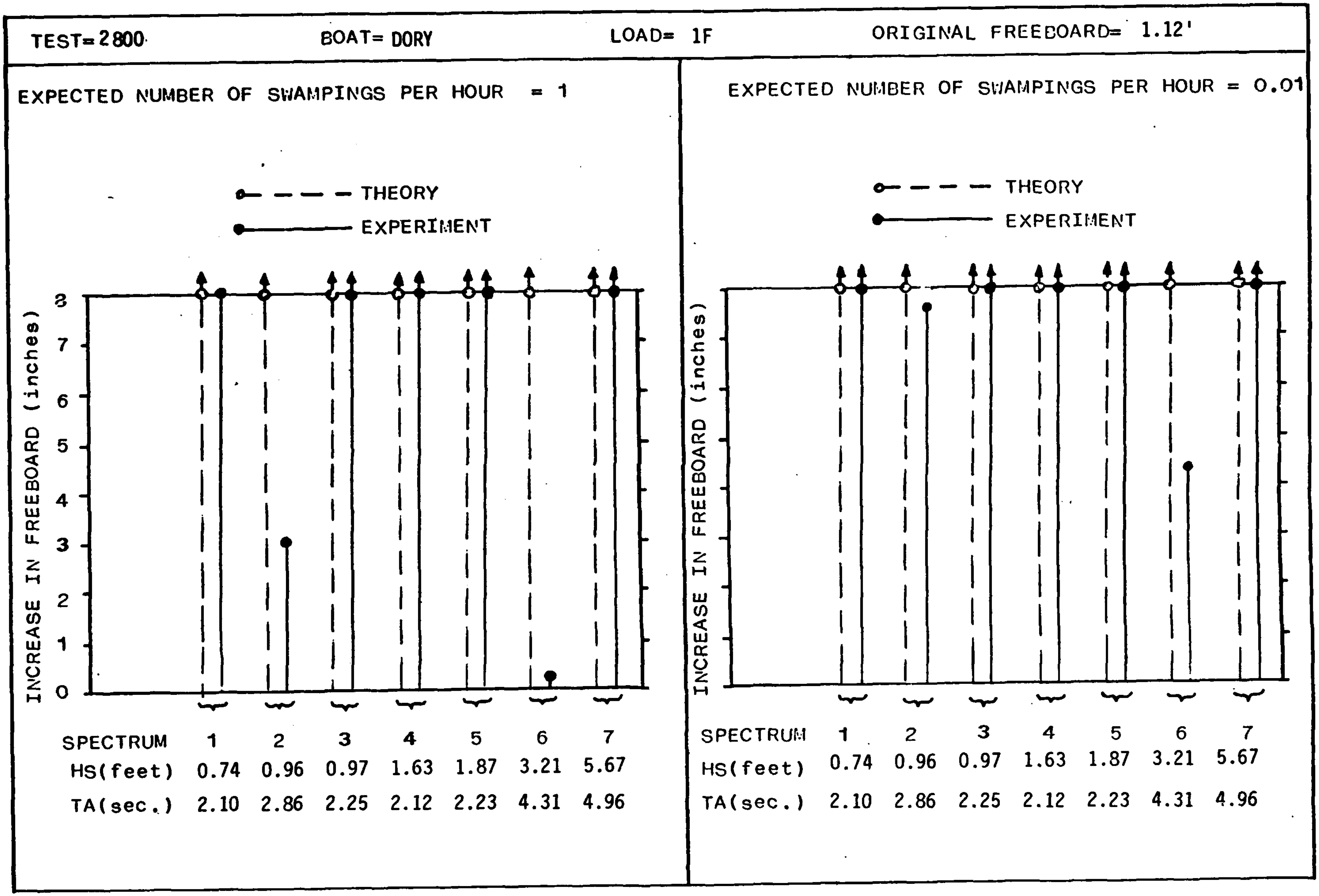

FIG. 76.INCREASE IN FREEBOARD FOR THE REQUIRED PROBABILITY OF SWAMPINGS, FOR SEVEN WAVE SPECTRA

APPENDICES

DERIVATION OF HEAVE AND SURGE FROM POTENTIOMETER READINGS

The second heave motion record (and optionally a surge record) can be derived from the measurements of potentiometers, using simple geometry. Figure 77 illustrates the test set up.

Two potentiometers, denoted 1 and 2 were calibrated to measure instantaneous values of the lengths of two wires, $p_1(t)$ and $p_2(t)$. The values $d_1(t)$, $d_2(t)$ and $w(t)$, also shown, represent respectivly the horizontal and vertical distances between the potentiometers and the boat center of gravity.Let the values of $d_1(t)$, $d_2(t)$ and $w(t)$ measured to the mean position of the center of gravity be d_1^o, d_2^o and w_o . Since the distance between the potentiometers was constant,

$$d_1(t)+d_2(t)=D. \tag{8}$$

The heave and surge motions, $h(t)$ and $s(t)$ are defined as

$$h(t)=w_o-w(t) \tag{9}$$

$$s(t)=d_1(t)-d_1^o \tag{10}$$

From geometry

$$w(t)=\sqrt{p_1^2(t)-d_1^2(t)} \tag{11}$$

and

$$w(t)=\sqrt{p_2^2(t)-d_2^2(t)}=\sqrt{p_2^2(t)-[D-d_1(t)]^2}$$

Therefore

$$p_1^2(t)-d_1^2(t)=p_2^2(t)-[D-d_1(t)]^2$$

$$(12)$$

$$d_1^2(t)=[p_1^2(t)-p_2^2(t)+D^2]/2D$$

Upon substitution of (11) and (12) into (9) and (10), the heave and surge records become available by explicit functions of the potentiometer readings $p_1(t)$ and $p_2(t)$, and the quantities w_o, d_1^o and D. The value of w_o was measured with the boat in still water. If there were no drifting motion of the boat, the parameter d_1^o could also be measured in still water. However, the second order wave

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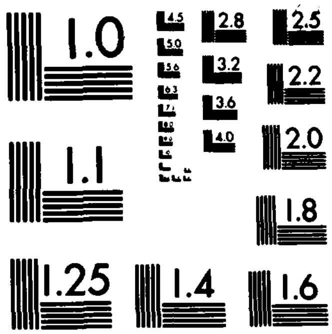

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

force ("drift" force) causes some drift downstream until the mean force in the tethering line reaches the steady dynamic state. Thus in each different test there was a different mean boat position, i.e., a different value of d♀ . Therefore this value had to be read with the waves going, after the steady state has been reached. This value was measured with the help of a carpenter's plumb, as sketched in Fig.77. It is believed that with care it is possible to obtain fairly accurate results with this method. Unfortunately, in the present case some mismeasurements occured due to lack of experience with this system. Therefore the resultant heave record (of this instrument only) can be somewhat in error. Recall that the acoustically measured heave is not affected by it.

It should be pointed out that this procedure should not be used in irregular waves since both the drift force and the mean boat position in surge then vary in time slowly. In contrast the drift force in regular waves is constant in time, thus there exists a constant mean position in surge.

The vertical fluid forces are order(s) of magnitude larger than the vertical component of the tethering line force, therefore the effect of the lines on the heave and pitch motions should be negligible. However the horizontal surge force is smaller, being comparable to the horizontal mooring force, thus the surge motion measurement can be affected by the tethering system.

This procedure is considered secondary in accuracy to the MST instrument now available at the Offshore Technology facilities.

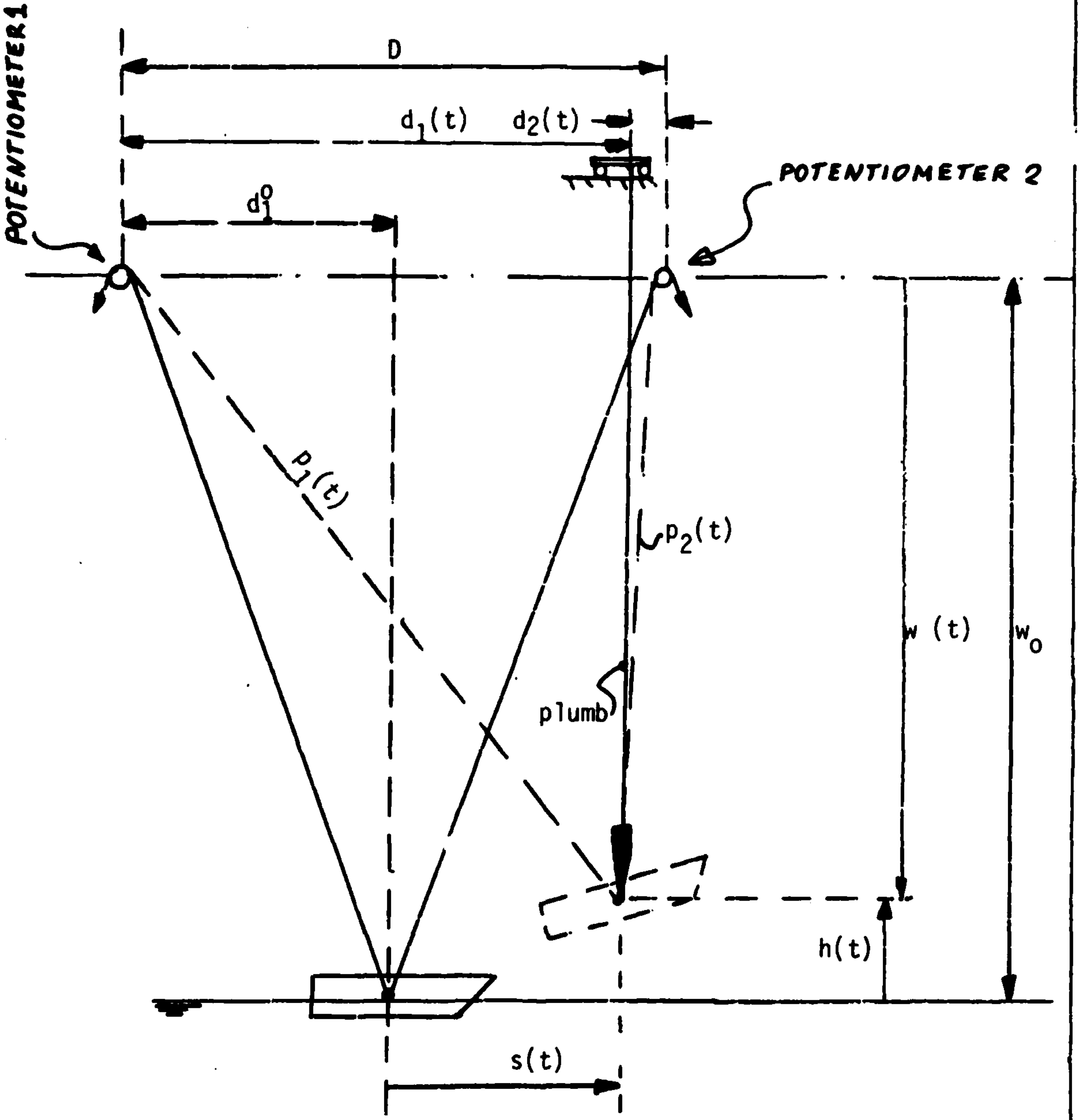

FIG. 77. TEST SET UP FOR MEASURING HEAVE MOTION.

APPENDIX 2

LOADING SHEETS

The following pages present computer printouts with the weights, inertia and center of gravity data for all combinations of boats and loading conditions.

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	13.5'JON
TEST NUMBER	=	100
LOAD	=	1 MAN AFT
LOA(FT)	=	13.50
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1917.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	80.50	6.00	.50
2MOTOR	65.25	-.21	1.50
3PORT GYRO	4.50	7.46	.19
4STBD.GYRO	4.50	6.20	.19
5AFT WAVE PROBE	3.25	-.28	1.71
6FWD WAVE PROBE	3.25	13.77	1.92
7WEIGHT A	165.00	2.16	1.33
8WEIGHT B	.00	.00	.00
9WEIGHT C/D	14.00	7.32	.05
10TETHER CHAIN	2.20	1.40	.00
TOTALS	342.45	3.03	1.09

DISPLACEMENT(LBS)	=	342.45
LCG(FROM BOW(FT)	=	10.47
VCG(ABOVE BL(FT)	=	1.09
PITCH IN.(LB-FT2)	=	4321.48

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	13.5' JON
TEST NUMBER	=	300
LOAD	=	2 MEN AFT
LOA(FT)	=	13.50
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1917.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	80.50	6.00	.50
2MOTOR	65.25	-.21	1.50
3PORT GYRO	4.50	7.46	.19
4STBD.GYRO	4.50	6.20	.19
5AFT WAVE PROBE	3.25	-.28	1.71
6FWD WAVE PROBE	3.25	13.77	1.92
7WEIGHT A	165.00	2.16	1.33
8WEIGHT B	165.00	2.16	1.33
9WEIGHT C/D	14.00	7.32	.05
10TETHER CHAIN	2.20	2.50	.00
TOTALS	507.45	2.75	1.17

DISPLACEMENT(LBS)	=	507.45
LCG(FROM BOW(FT)	=	10.75
VCG(ABOVE BL(FT)	=	1.17
PITCH IN.(LB-FT2)	=	4407.95

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	13.5'JON
TEST NUMBER	=	500
LOAD	=	1A/1M
LOA(FT)	=	13.50
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1917.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	80.50	6.00	.50
2MOTOR	65.25	-.21	1.50
3PORT GYRO	4.50	7.46	.19
4STBD.GYRO	4.50	6.20	.19
5AFT WAVE PROBE	3.25	-.28	1.71
6FWD WAVE PROBE	3.25	13.77	1.92
7WEIGHT A	165.00	2.16	1.33
8WEIGHT B	165.00	8.57	1.33
9WEIGHT C/D	14.00	7.32	.05
10TETHER CHAIN	2.20	2.50	.00
TOTALS	507.45	4.83	1.17

DISPLACEMENT(LBS)	=	507.45
LCG(FROM BOW(FT)	=	8.67
VCG(ABOVE BL(FT)	=	1.17
PITCH IN.(LB-FT2)	=	7735.46

WEIGHT AND INERTIA CALCULATIONS

BOAT	=13.5'JON
TEST NUMBER	= 700
LOAD	= 2 MEN FWD
LOA(FT)	= 13.50
LIGHT INERTIA IN PITCH(LBS-FT2)	= 1917.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	80.50	6.00	.50
2MOTOR	65.25	-.21	1.50
3PORT GYRO	4.50	7.46	.19
4STBD.GYRO	4.50	6.20	.19
5AFT WAVE PROBE	3.25	-.28	1.71
6FWD WAVE PROBE	3.25	13.77	1.92
7WEIGHT A	165.00	12.83	1.33
8WEIGHT B	165.00	12.83	1.33
9WEIGHT C/D	14.00	7.32	.05
10TETHER CHAIN	2.20	11.50	.00
TOTALS	507.45	9.73	1.17

DISPLACEMENT(LBS)	= 507.45
LCG(FROM BOW(FT)	= 3.77
VCG(ABOVE BL(FT)	= 1.17
PITCH IN.(LB-FT2)	= 13285.06

WEIGHT AND INERTIA CALCULATIONS

BOAT = .5 SCALE J
TEST NUMBER = 900
LOAD = 1 MAN AFT
LOA(FT) = 6.75
LIGHT INERTIA IN PITCH(LBS-FT2) = 76.9

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	13.78	3.28	.18
2MOTOR	8.15	-.10	.67
3PORT GYRO	4.50	3.86	.13
4STBD.GYRO	4.50	2.69	.13
5AFT WAVE PROBE	3.27	-.10	1.33
6FWD WAVE PROBE	.00	.00	.00
7WEIGHT A	14.49	1.11	.69
8WEIGHT B	.00	.00	.00
9WEIGHT C/D	.00	.00	.00
10TETHER CHAIN	.27	.70	.00
TOTALS	48.96	1.83	.48

DISPLACEMENT(LBS) = 48.96
LCG(FROM BOW(FT) = 4.92
VCG(ABOVE BL(FT) = .48
PITCH IN.(LB-FT2) = 183.83

WEIGHT AND INERTIA CALCULATIONS

BOAT	=8'DINGHY
TEST NUMBER	= 1100
LOAD	= 1 MAN AFT
LOA(FT)	= 8.00
LIGHT INERTIA IN PITCH(LBS-FT2)	= 788.2

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	90.75	3.44	.69
2MOTOR	65.25	-.21	1.45
3PORT GYRO	4.50	3.83	.10
4STBD.GYRO	4.50	3.04	.10
5AFT WAVE PROBE	3.25	-.33	2.08
6FWD WAVE PROBE	.00	.00	.00
7WEIGHT A	150.00	2.00	1.60
8WEIGHT B	.00	.00	.00
9WEIGHT C/D	22.25	3.44	.05
10TETHER CHAIN	2.20	1.33	-.13
TOTALS	342.70	2.07	1.18

DISPLACEMENT(LBS)	= 342.70
LCG(FROM BOW(FT)	= 5.93
VCG(ABOVE BL(FT)	= 1.18
PITCH IN.(LB-FT2)	= 1476.67

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	8′ DINGHY
TEST NUMBER	=	1300
LOAD	=	1 MAN AFT
LOA(FT)	=	8.00
LIGHT INERTIA IN PITCH(LBS-FT2)	=	895.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	83.25	3.56	.63
2MOTOR	65.25	-.21	1.45
3MST	4.50	3.56	.63
4GYRO	.00	.00	.00
5AFT WAVE PROBE	6.50	-.33	2.08
6FWD WAVE PROBE	.00	.00	.00
7WEIGHT A	150.00	2.03	1.60
8WEIGHT B	22.00	3.52	.06
9WEIGHT C/D	2.25	2.77	.06
10TETHER CHAIN	2.90	1.34	.00
TOTALS	336.65	2.05	1.20

DISPLACEMENT(LBS)	=	336.65
LCG(FROM BOW(FT)	=	5.95
VCG(ABOVE BL(FT)	=	1.20
PITCH IN.(LB-FT2)	=	1612.70

WEIGHT AND INERTIA CALCULATIONS

BOAT	=8'DINGHY
TEST NUMBER	= 1500
LOAD	= EVEN KEEL
LOA(FT)	= 8.00
LIGHT INERTIA IN PITCH(LBS-FT2)	= 895.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	83.25	3.56	.63
2MOTOR	.00	-.21	1.45
3MST	4.50	3.56	.63
4GYRO	.00	.00	.00
5AFT WAVE PROBE	3.25	-.33	2.08
6FWD WAVE PROBE	3.25	8.04	1.92
7WEIGHT A	150.00	2.02	1.68
8WEIGHT B	104.00	6.08	.94
9WEIGHT C/D	75.00	.48	.06
10WEIGHT E	2.25	2.81	.75
11TETHER CHAIN	2.90	6.74	.00
TOTALS	428.40	3.12	.99

DISPLACEMENT(LBS)	= 428.40
LCG(FROM BOW(FT)	= 4.88
VCG(ABOVE BL(FT)	= .99
PITCH IN.(LB-FT2)	= 2840.54

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	14' JON
TEST NUMBER	=	1700
LOAD	=	2 A/1 M
LOA(FT)	=	14.00
LIGHT INERTIA IN PITCH(LBS-FT2)	=	8851.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1LOADED BOAT	784.50	4.07	1.23
TOTALS	784.50	4.07	1.23

DISPLACEMENT(LBS)	=	784.50
LCG(FROM BOW(FT)	=	9.93
VCG(ABOVE BL(FT)	=	1.23
PITCH IN.(LB-FT2)	=	8851.00

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	14'JON
TEST NUMBER	=	1900
LOAD	=	2 F/1 M
LOA(FT)	=	14.00
LIGHT INERTIA IN PITCH(LBS-FT2)	=	16036.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1LOADED BOAT	785.20	8.76	1.37
TOTALS	785.20	8.76	1.37

DISPLACEMENT(LBS)	=	785.20
LCG(FROM BOW(FT)	=	5.24
VCG(ABOVE BL(FT)	=	1.37
PITCH IN.(LB-FT2)	=	16036.01

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	RUNABOUT
TEST NUMBER	=	2000
LOAD	=	3A/2M
LOA(FT)	=	15.33
LIGHT INERTIA IN PITCH(LBS-FT2)	=	12320.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	596.50	6.51	1.11
2OUTBOARD MOTOR	65.25	-.42	2.08
3GYRO	4.50	7.42	1.63
4MST	3.50	4.09	1.71
5FWD WAVE PROBE	.00	.00	.00
62 AFT WAVE PROBES	3.25	15.34	3.29
7WEIGHTS 1,2	330.00	7.47	2.15
8WEIGHTS 3,4,5	495.00	1.84	1.60
9GEAR	157.00	5.72	1.08
10TETHER CHAIN	2.20	3.66	.00
TOTALS	1657.20	4.97	1.50

DISPLACEMENT(LBS)	=	1657.20
LCG(FROM BOW(FT)	=	10.36
VCG(ABOVE BL(FT)	=	1.50
PITCH IN.(LB-FT2)	=	23313.90

WEIGHT AND INERTIA CALCULATIONS

BOAT = RUNABOUT
TEST NUMBER = 1100
LOAD = 3A
LOA(FT) = 15.33
LIGHT INERTIA IN PITCH(LBS-FT2) = 12320.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	596.50	6.51	1.11
2OUTBOARD MOTOR	65.25	-.42	2.08
3GYRO	4.50	7.42	1.63
4MST	3.50	4.09	1.71
5FWD WAVE PROBE	.00	.00	.00
62 AFT WAVE PROBES	3.25	15.34	3.29
7WEIGHTS 1,2	.00	.00	.00
8WEIGHTS 3,4,5	495.00	1.84	1.60
9GEAR	157.00	5.72	1.08
10TETHER CHAIN	2.20	3.66	.00
TOTALS	1327.20	4.35	1.34

DISPLACEMENT(LBS) = 1327.20
LCG(FROM BOW(FT) = 10.98
VCG(ABOVE BL(FT) = 1.34
PITCH IN.(LB-FT2) = 20565.60

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	RUNABOUT
TEST NUMBER	=	1200
LOAD	=	2F/2M
LOA(FT)	=	15.33
LIGHT INERTIA IN PITCH(LBS-FT2)	=	12320.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	596.50	6.51	1.11
2OUTBOARD MOTOR	65.25	-.42	2.08
3GYRO	4.50	7.42	1.63
4MST	3.50	4.09	1.71
5FWD WAVE PROBE	3.25	15.34	3.29
62 AFT WAVE PROBES	.00	.00	.00
7WEIGHTS 1,2	330.00	7.47	2.15
8WEIGHTS 3,4	330.00	12.52	1.66
9GEAR	157.00	5.72	1.08
10TETHER CHAIN	2.20	3.66	.00
TOTALS	1492.20	7.68	1.51

DISPLACEMENT(LBS)	=	1492.20
LCG(FROM BOW(FT)	=	7.65
VCG(ABOVE BL(FT)	=	1.51
PITCH IN.(LB-FT2)	=	26341.15

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	SKIFF
TEST NUMBER	=	2300
LOAD	=	2A/1M
LOA(FT)	=	12.12
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1368.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	54.00	4.88	.75
2OUTBOARD MOTOR	65.25	-.50	1.67
3GYRO	4.50	11.00	1.98
4MST	3.50	6.54	1.33
5FWD WAVE PROBE	.00	.00	.00
62 AFT WAVE PROBES	6.50	.17	.67
7WEIGHT A	165.00	1.25	.79
8WEIGHT B	165.00	1.25	.79
9WEIGHT C	165.00	6.21	2.12
10TETHER CHAIN	.00	.00	.00
TOTALS	628.75	2.77	1.24

DISPLACEMENT(LBS)	=	628.75
LCG(FROM BOW(FT)	=	9.36
VCG(ABOVE BL(FT)	=	1.24
PITCH IN.(LB-FT2)	=	5645.26

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	SKIFF
TEST NUMBER	=	2400
LOAD	=	1A/1M
LOA(FT)	=	12.12
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1368.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	54.00	4.88	.75
2OUTBOARD MOTOR	65.25	-.50	1.67
3GYRO	4.50	11.00	1.98
4MST	3.50	6.54	1.33
5FWD WAVE PROBE	.00	.00	.00
62 AFT WAVE PROBES	6.50	.17	.67
7WEIGHT A	165.00	1.17	.79
8WEIGHT B	.00	.00	.00
9WEIGHT C	165.00	6.21	2.12
10TETHER CHAIN	.00	.00	.00
TOTALS	463.75	3.28	1.40

DISPLACEMENT(LBS)	=	463.75
LCG(FROM BOW(FT)	=	8.84
VCG(ABOVE BL(FT)	=	1.40
PITCH IN.(LB-FT2)	=	5138.68

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	SKIFF
TEST NUMBER	=	1500
LOAD	=	2F/1M
LOA(FT)	=	12.12
LIGHT INERTIA IN PITCH(LBS-FT2)	=	1368.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	54.00	4.88	.75
2OUTBOARD MOTOR	65.25	-.50	1.67
3GYRO	4.50	11.00	1.98
4MST	3.50	6.54	1.33
5FWD WAVE PROBE	3.25	12.29	2.50
62 AFT WAVE PROBES	.00	.00	.00
7WEIGHT A	165.00	8.83	1.50
8WEIGHT B	165.00	8.83	1.50
9WEIGHT C	165.00	6.21	2.12
10TETHER CHAIN	.00	.00	.00
TOTALS	625.50	6.85	1.63

DISPLACEMENT(LBS)	=	625.50
LCG(FROM BOW(FT)	=	5.28
VCG(ABOVE BL(FT)	=	1.63
PITCH IN.(LB-FT2)	=	6730.44

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	DORY
TEST NUMBER	=	2600
LOAD	=	1A/1M
LOA(FT)	=	15.83
LIGHT INERTIA IN PITCH(LBS-FT2)	=	2485.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	155.00	8.08	.73
2GYRO	4.50	11.63	.69
3MST	3.50	6.50	.17
4FWD WAVE PROBE	.00	.00	.00
5AFT WAVE PROBE	3.25	.00	3.06
6WEIGHT A	165.00	2.75	1.54
7WEIGHT B	165.00	8.50	1.44
8WEIGHT C	.00	.00	.00
9TETHER CHAIN	.00	.00	.00
TOTALS	496.25	6.42	1.25

DISPLACEMENT(LBS)	=	496.25
LCG(FROM BOW(FT)	=	9.42
VCG(ABOVE BL(FT)	=	1.25
PITCH IN.(LB-FT2)	=	6184.27

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	DORY
TEST NUMBER	=	2700
LOAD	=	1A
LOA(FT)	=	15.83
LIGHT INERTIA IN PITCH(LBS-FT2)	=	2485.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	155.00	8.08	.73
2GYRO	4.50	11.63	.69
3MST	3.50	6.50	.17
4FWD WAVE PROBE	.00	.00	.00
5AFT WAVE PROBE	3.25	.00	3.06
6WEIGHT A	165.00	2.75	1.54
7WEIGHT B	.00	.00	.00
8WEIGHT C	.00	.00	.00
9TETHER CHAIN	.00	.00	.00
TOTALS	331.25	5.38	1.15

DISPLACEMENT(LBS)	=	331.25
LCG(FROM BOW(FT)	=	10.46
VCG(ABOVE BL(FT)	=	1.15
PITCH IN.(LB-FT2)	=	5099.09

WEIGHT AND INERTIA CALCULATIONS

BOAT	=	DORY
TEST NUMBER	=	2800
LOAD	=	1F
LOA(FT)	=	15.83
LIGHT INERTIA IN PITCH(LBS-FT2)	=	2485.0

ITEM	WEIGHT(LB)	X(AP,FT)	Y(ABOVE BL,FT)
1BARE HULL	155.00	8.08	.73
2GYRO	4.50	11.63	.69
3MST	3.50	6.50	.17
4FWD WAVE PROBE	3.25	16.00	2.67
5AFT WAVE PROBE	.00	.00	.00
6WEIGHT A	165.00	12.50	1.17
7WEIGHT B	.00	.00	.00
8WEIGHT C	.00	.00	.00
9TETHER CHAIN	.00	.00	.00
TOTALS	331.25	10.39	.96

DISPLACEMENT(LBS)	=	331.25
LCG(FROM BOW(FT)	=	5.44
VCG(ABOVE BL(FT)	=	.96
PITCH IN.(LB-FT2)	=	4236.11

APPENDIX 3

COEFFICIENTS IN THE EQUATIONS OF MOTION FROM HANSEL

This Appendix lists partial outputs of computer program HANSEL containing the hydrostatic and hydrodynamic coefficients in equations of motion individually for each load condition.

The following page is a copy of the HANSEL printout defining the non-dimensionalization of the dynamic quantities.

The data consists of three pages per each loading case. The first lists hydrostatic coefficients in the equations of motion, as well as geometrical and inertial quantities used in non-dimensionalization of the dynamic terms. The second and third pages present non-dimensional added mass and damping coefficients, respectively.

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DEFINITIONS, OUTPUT SCALING INFORMATION, DIMENSIONALIZATION FACTORS, AND COORDINATE SYSTEM DESCRIPTION


M=DISPLACED MASS      V=DISPLACED VOLUME      RO=DENSITY OF FLUID (M/V)      G=ACCELERATION OF GRAVITY
FN=FROUDE NUMBER      B=BEAM      L=LENGTH BETWEEN PERPENDICULARS
AMPL.=AMPLITUDE      R=WAVE AMPLITUDE      LAM=WAVELENGTH      K=WAVE NUMBER (360 DEG/LAM)      K*R=WAVE SLOPE
PHASE=PHASE LAG (DEGREES) WITH RESPECT TO THE MAXIMUM WAVE ELEVATION AT THE ORIGIN OF THE X,Y,Z COORDINATE SYSTEM.
WE=WAVE FREQUENCY OF ENCOUNTER (RAD/SEC)      WE(ND)= WE * SQRT(L/G)   (NONDIMENSIONAL)


A(1,1)=ADDED MASS IN SURGE      A(2,2)=ADDED MASS IN SWAY      A(3,3)=ADDED MASS IN HEAVE      A(4,4)=ADDED MOMENT IN ROLL
A(5,5)=ADDED MOMENT IN PITCH      A(6,6)=ADDED MOMENT IN YAW      A(3,5)=COUPLED ADDED MASS FOR PITCH INTO HEAVE
A(2,4)=COUPLED ADDED MASS FOR ROLL INTO SWAY      A(2,6)=COUPLED ADDED MASS FOR YAW INTO SWAY
A(4,6)=COUPLED ADDED MOMENT FOR YAW INTO ROLL
B(1,1)=SURGE DAMPING      B(2,2)=SWAY DAMPING      B(3,3)=HEAVE DAMPING      B(4,4)=ROLL DAMPING
B(5,5)=PITCH DAMPING      B(6,6)=YAW DAMPING      B(3,5)=COUPLED PITCH INTO HEAVE DAMPING
B(2,4)=COUPLED ROLL INTO SWAY DAMPING      B(2,6)=COUPLED YAW INTO SWAY DAMPING      B(4,6)=COUPLED YAW INTO ROLL DAMPING


A(1,1),A(2,2) AND A(3,3) ARE DIMENSIONED WITH RESPECT TO MASS.   A(4,4),A(5,5),A(6,6) AND A(4,6) ARE DIMENSIONED
WITH RESPECT TO MASS*L*L.   A(3,5),A(2,6) AND A(2,4) ARE DIMENSIONED WITH RESPECT TO MASS*L.
THE DAMPING COEFFICIENTS ARE DIMENSIONED WITH RESPECT TO THE CORRESPONDING FACTORS * SQRT(G/L).

EXCITING FORCES ARE SCALED BY M*G*R/L.      EXCITING MOMENTS ARE SCALED BY M*G*R.
SURGE,SWAY AND HEAVE MOTIONS ARE SCALED BY R.      ROLL,PITCH AND YAW MOTIONS ARE SCALED BY K*R.
SHEAR FORCES ARE SCALED BY RO*G*B*L*R.      MOMENTS ARE SCALED BY RO*G*B*L*L*R.


THE REFERENCE COORDINATE SYSTEM FOR THE MOTIONS IS AS FOLLOWS-

THE ORIGIN IS ON THE CENTERLINE AND LIES IN THE LOAD WATER PLANE WITH A LONGITUDINAL LOCATION THE SAME AS THE CG.
THE X-AXIS IS ALONG THE CENTERLINE AND POSITIVE IN THE DIRECTION OF THE AP.   THE Y-AXIS IS POSITIVE TO STARBOARD.
THE Z-AXIS IS POSITIVE UPWARDS.

THE POSITIVE DIRECTIONS OF THE MOTIONS ARE THE SAME AS THE POSITIVE DIRECTIONS OF AXES.


THE REFERENCE COORDINATE SYSTEM FOR SEA-LOADS HAS ITS ORIGIN ON THE CENTERLINE OF THE STATION AND AXES PARALLEL TO THE
MOTION COORDINATE SYSTEM AXES.


THE LENGTH DIMENSION USED=FEET  .     THE FORCE DIMENSION USED=TONS  .     THE MOMENT DIMENSION USED=FT-TONS .
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TEST 100

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    8.7700
BEAM AT MIDSHIP=    3.0000

DISPLACED VOLUME/(L/2)**3=    .648089E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .131918E+01
VERTICAL CENTER OF BOYANCY/L=  -.169439E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .312532E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .383042E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .526738E+01
PITCH-PITCH RESTORING COEFFICIENT=    .370373E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .780000E+00
TOTAL MASS=      .0047
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .164200E+00
(YAW-RADIUS OF GYRATION/L)**2=    .164200E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 36).

IRR= 2 . IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.166	1.2859E-01	3.8425E-01	6.7912E+00	2.4550E-02	6.6223E-01	1.6717E-02	9.3358E-01	2.5550E-02	-6.0205E-02	-5.9937E-04
1.391	1.1422E-01	3.9816E-01	5.9487E+00	2.4975E-02	5.8266E-01	1.7313E-02	8.2544E-01	2.6482E-02	-6.2333E-02	-5.8726E-04
1.616	1.0419E-01	4.0224E-01	5.3442E+00	2.4923E-02	5.2456E-01	1.7561E-02	7.4570E-01	2.6278E-02	-6.2469E-02	-4.4221E-04
1.841	9.7215E-02	3.9265E-01	4.9054E+00	2.4272E-02	4.8243E-01	1.7124E-02	6.8551E-01	2.4601E-02	-6.0000E-02	-1.5764E-04
2.066	9.2464E-02	3.6959E-01	4.5864E+00	2.3897E-02	4.5080E-01	1.6206E-02	6.3922E-01	2.1722E-02	-5.5174E-02	2.0533E-04
2.290	8.9377E-02	3.3859E-01	4.3566E+00	2.1609E-02	4.2723E-01	1.4929E-02	6.0309E-01	1.8255E-02	-4.8891E-02	5.5598E-04
2.515	8.7559E-02	3.0373E-01	4.1946E+00	2.0043E-02	4.0977E-01	1.3584E-02	5.7463E-01	1.4811E-02	-4.2174E-02	8.2759E-04
2.740	8.6716E-02	2.6946E-01	4.0851E+00	1.8571E-02	3.9702E-01	1.2096E-02	5.5208E-01	1.1763E-02	-3.5771E-02	9.9690E-04
2.965	8.6618E-02	2.3807E-01	4.0164E+00	1.7282E-02	3.8794E-01	1.0795E-02	5.3422E-01	9.2459E-03	-3.0085E-02	1.0721E-03
3.190	8.7081E-02	2.1047E-01	3.9793E+00	1.6207E-02	3.8176E-01	9.6412E-03	5.2017E-01	7.2546E-03	-2.5249E-02	1.0744E-03
3.414	8.8012E-02	1.8677E-01	3.9863E+00	1.5339E-02	3.7898E-01	8.6392E-03	5.0454E-01	5.7235E-03	-2.1247E-02	1.0257E-03
3.639	9.2317E-02	1.6669E-01	4.0558E+00	1.4653E-02	3.8107E-01	7.7801E-03	4.8016E-01	4.5739E-03	-1.7991E-02	9.4428E-04
3.864	9.5985E-02	1.5247E-01	4.1380E+00	1.4349E-02	3.8331E-01	7.1993E-03	4.6170E-01	4.3562E-03	-1.5954E-02	7.0737E-04
4.089	9.9805E-02	1.4092E-01	4.2520E+00	1.4266E-02	3.8558E-01	6.6919E-03	4.4913E-01	4.2670E-03	-1.4586E-02	4.7615E-04
4.314	1.0163E-01	1.3109E-01	4.3613E+00	1.4232E-02	3.8794E-01	6.2389E-03	4.4303E-01	4.2012E-03	-1.3526E-02	2.7803E-04
4.538	1.0792E-01	1.2217E-01	4.5055E+00	1.4230E-02	3.9224E-01	5.8305E-03	4.3988E-01	4.1682E-03	-1.2640E-02	1.1560E-04
4.763	1.1267E-01	1.1460E-01	4.6293E+00	1.4322E-02	3.9663E-01	5.4847E-03	4.4286E-01	4.1393E-03	-1.2046E-02	-1.7861E-05
4.988	1.1618E-01	1.0793E-01	4.7224E+00	1.4437E-02	4.0046E-01	5.1768E-03	4.4750E-01	4.0885E-03	-1.1602E-02	-1.0737E-04
5.213	1.1869E-01	1.0195E-01	4.7913E+00	1.4501E-02	4.0385E-01	4.8980E-03	4.5340E-01	4.0364E-03	-1.1129E-02	-1.8260E-04
5.438	1.2048E-01	9.6583E-02	4.8585E+00	1.4550E-02	4.0832E-01	4.6470E-03	4.6525E-01	3.9752E-03	-1.0840E-02	-2.3431E-04
5.662	1.2172E-01	9.1725E-02	4.9348E+00	1.4561E-02	4.1393E-01	4.4183E-03	4.7355E-01	3.9178E-03	-1.0518E-02	-2.7724E-04
5.887	1.2242E-01	8.7309E-02	4.9883E+00	1.4543E-02	4.1861E-01	4.2092E-03	4.8139E-01	3.8521E-03	-1.0200E-02	-3.1266E-04
6.112	1.2271E-01	8.3282E-02	5.0253E+00	1.4502E-02	4.2254E-01	4.0176E-03	4.8884E-01	3.7897E-03	-9.9074E-03	-3.4170E-04
6.337	1.2264E-01	7.9691E-02	5.0407E+00	1.4475E-02	4.2457E-01	3.8379E-03	4.9278E-01	3.7366E-03	-9.7891E-03	-3.4574E-04
6.562	1.2230E-01	7.6658E-02	5.0451E+00	1.4443E-02	4.2614E-01	3.6952E-03	4.9657E-01	3.7613E-03	-9.5561E-03	-3.6039E-04
6.786	1.2174E-01	7.3843E-02	5.0405E+00	1.4392E-02	4.2736E-01	3.5622E-03	5.0023E-01	3.7754E-03	-9.4021E-03	-3.7221E-04
7.011	1.2101E-01	7.1225E-02	5.0288E+00	1.4325E-02	4.2831E-01	3.4382E-03	5.0381E-01	3.7805E-03	-9.2484E-03	-3.8160E-04
7.236	1.2014E-01	6.8785E-02	5.0114E+00	1.4247E-02	4.2906E-01	3.3222E-03	5.0737E-01	3.7779E-03	-9.0958E-03	-3.8894E-04
7.461	1.1917E-01	6.6969E-02	4.9894E+00	1.4185E-02	4.2968E-01	3.2203E-03	5.1094E-01	3.8230E-03	-9.0112E-03	-4.0225E-04
7.686	1.1810E-01	6.5321E-02	4.9640E+00	1.4123E-02	4.3023E-01	3.1247E-03	5.1460E-01	3.8593E-03	-8.9365E-03	-4.1394E-04
7.910	1.1699E-01	6.3751E-02	4.9408E+00	1.4055E-02	4.3081E-01	3.0346E-03	5.1800E-01	3.8850E-03	-8.8554E-03	-4.2374E-04
8.135	1.1582E-01	6.2253E-02	4.9150E+00	1.3981E-02	4.3147E-01	2.9499E-03	5.2176E-01	3.9015E-03	-8.7609E-03	-4.3215E-04
8.360	1.1462E-01	6.0825E-02	4.8892E+00	1.3905E-02	4.3232E-01	2.8701E-03	5.2589E-01	3.9097E-03	-8.6772E-03	-4.3975E-04
8.585	1.1341E-01	5.9728E-02	4.8691E+00	1.3839E-02	4.3360E-01	2.8019E-03	5.3006E-01	3.8679E-03	-8.6192E-03	-4.4110E-04
8.810	1.1220E-01	5.9894E-02	4.8533E+00	1.3798E-02	4.3549E-01	2.9412E-03	5.3577E-01	4.1802E-03	-8.6350E-03	-4.6945E-04
9.035	1.1101E-01	5.9626E-02	4.8461E+00	1.3684E-02	4.3873E-01	2.7720E-03	5.4456E-01	4.0678E-03	-8.5174E-03	-4.8056E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.166	1.4224E-01	4.1803E-02	8.3783E+00	1.9921E-03	7.9259E-01	1.7503E-03	1.3801E+00	4.0811E-03	-8.2206E-03	-3.6567E-04
1.391	1.4759E-01	9.2126E-02	8.8344E+00	4.2479E-03	8.4263E-01	3.8594E-03	1.1685E+00	8.9530E-03	-1.7886E-02	-7.7618E-04
1.616	1.4885E-01	1.6984E-01	9.0804E+00	7.5781E-03	8.7376E-01	7.1173E-03	1.2184E+00	1.6261E-02	-3.2237E-02	-1.3319E-03
1.841	1.4684E-01	2.6980E-01	9.1981E+00	1.1668E-02	8.9017E-01	1.1311E-02	1.2586E+00	2.5131E-02	-5.0281E-02	-1.8823E-03
2.066	1.4223E-01	3.7914E-01	9.1001E+00	1.5920E-02	8.9476E-01	1.5912E-02	1.2847E+00	3.3950E-02	-6.9368E-02	-2.2281E-03
2.290	1.3558E-01	4.6383E-01	8.9326E+00	1.9739E-02	8.8978E-01	2.0351E-02	1.2990E+00	4.1272E-02	-8.6868E-02	-2.2447E-03
2.515	1.2740E-01	5.7445E-01	8.6776E+00	2.2753E-02	8.7785E-01	2.4248E-02	1.3036E+00	4.6420E-02	-1.0112E-01	-1.9332E-03
2.740	1.1814E-01	6.4740E-01	8.3543E+00	2.4851E-02	8.5810E-01	2.7456E-02	1.2997E+00	4.9424E-02	-1.1159E-01	-1.3773E-03
2.965	1.0819E-01	7.0306E-01	7.9794E+00	2.6096E-02	8.3422E-01	2.9984E-02	1.2665E+00	5.0655E-02	-1.1850E-01	-6.7841E-04
3.190	9.7853E-02	7.4360E-01	7.5672E+00	2.6629E-02	8.0651E-01	3.1911E-02	1.2711E+00	5.0551E-02	-1.2240E-01	8.1123E-05
3.414	8.7575E-02	7.7162E-01	7.1481E+00	2.6603E-02	7.7658E-01	3.3334E-02	1.2459E+00	4.9481E-02	-1.2386E-01	8.4684E-04
3.639	7.8396E-02	7.8947E-01	6.7144E+00	2.6155E-02	7.4532E-01	3.4342E-02	1.2123E+00	4.7722E-02	-1.2342E-01	1.5886E-03
3.864	6.9669E-02	7.8824E-01	6.2536E+00	2.5395E-02	7.1317E-01	3.4301E-02	1.1728E+00	4.2899E-02	-1.2096E-01	2.4064E-03
4.089	6.1523E-02	7.7873E-01	5.8920E+00	2.4495E-02	6.8045E-01	3.4294E-02	1.1269E+00	3.8132E-02	-1.1774E-01	3.0807E-03
4.314	5.4002E-02	7.6694E-01	5.5061E+00	2.3522E-02	6.4745E-01	3.4159E-02	1.0827E+00	3.3899E-02	-1.1424E-01	3.5990E-03
4.538	4.9416E-02	7.5414E-01	5.1770E+00	2.2570E-02	6.1570E-01	3.3974E-02	1.0311E+00	3.0304E-02	-1.1062E-01	3.9809E-03
4.763	4.5241E-02	7.3853E-01	4.8715E+00	2.1630E-02	5.8458E-01	3.3585E-02	9.7988E-01	2.7155E-02	-1.0692E-01	4.2391E-03
4.988	4.1409E-02	7.2290E-01	4.5817E+00	2.0736E-02	5.5392E-01	3.3153E-02	9.2821E-01	2.4608E-02	-1.0351E-01	4.4385E-03
5.213	3.7875E-02	7.0845E-01	4.3064E+00	1.9864E-02	5.2381E-01	3.2748E-02	8.7646E-01	2.2336E-02	-1.0028E-01	4.5744E-03
5.438	3.4743E-02	6.9466E-01	4.0978E+00	1.9030E-02	4.9838E-01	3.2365E-02	8.3864E-01	2.0426E-02	-9.7264E-02	4.6784E-03
5.662	3.1808E-02	6.8187E-01	3.8735E+00	1.8224E-02	4.7306E-01	3.1898E-02	8.0534E-01	1.8704E-02	-9.4446E-02	4.7403E-03
5.887	2.9084E-02	6.6996E-01	3.6682E+00	1.7447E-02	4.4849E-01	3.1491E-02	7.7227E-01	1.7153E-02	-9.1748E-02	4.7640E-03
6.112	2.6549E-02	6.5883E-01	3.4740E+00	1.6697E-02	4.2455E-01	3.1105E-02	7.3952E-01	1.5756E-02	-8.9169E-02	4.7523E-03
6.337	2.4183E-02	6.4756E-01	3.2904E+00	1.6076E-02	4.0145E-01	3.0712E-02	7.0744E-01	1.4548E-02	-8.7115E-02	4.9403E-03
6.562	2.1972E-02	6.3427E-01	3.1167E+00	1.5456E-02	3.7914E-01	3.0107E-02	6.7610E-01	1.2628E-02	-8.4927E-02	5.1709E-03
6.786	1.9900E-02	6.2183E-01	2.9520E+00	1.4863E-02	3.5757E-01	2.9535E-02	6.4550E-01	1.0848E-02	-8.2854E-02	5.3709E-03
7.011	1.7954E-02	6.1016E-01	2.7956E+00	1.4293E-02	3.3669E-01	2.8594E-02	6.1560E-01	9.1959E-03	-8.0883E-02	5.5427E-03
7.236	1.6122E-02	5.9918E-01	2.6466E+00	1.3746E-02	3.1646E-01	2.8480E-02	5.8635E-01	7.6596E-03	-7.9003E-02	5.6879E-03
7.461	1.4395E-02	5.8670E-01	2.5044E+00	1.3194E-02	2.9681E-01	2.7960E-02	5.5768E-01	5.9820E-03	-7.6953E-02	5.8362E-03
7.686	1.2761E-02	5.7457E-01	2.3683E+00	1.2666E-02	2.7766E-01	2.7463E-02	5.2947E-01	4.4034E-03	-7.4924E-02	5.9605E-03
7.910	1.1183E-02	5.6309E-01	2.2258E+00	1.215[illegible]E-02	2.5882E-01	2.6987E-02	5.0263E-01	2.9299E-03	-7.2969E-02	6.0576E-03
8.135	9.6398E-03	5.5222E-01	2.0724E+00	1.165[illegible]	2.4014E-01	2.6529E-02	4.7729E-01	1.5538E-03	-7.1074E-02	6.1257E-03
8.360	8.4805E-03	5.4190E-01	2.0383E+00	1.1169[illegible]	2.2250E-01	2.6088E-02	4.4120E-01	2.6895E-04	-6.9219E-02	6.1602E-03
8.585	6.9517E-03	5.2986E-01	1.8465E+00	1.0560[illegible]	2.0304E-01	2.5604E-02	4.2015E-01	-5.7516E-04	-6.6869E-02	6.0708E-03
8.810	5.5476E-03	5.3762E-01	1.6839E+00	1.0247E-02	1.8340E-01	2.6783E-02	3.9154E-01	4.4379E-03	-6.6156E-02	5.4403E-03
9.035	4.1498E-03	4.9764E-01	1.5072E+00	8.9416E-03	1.6147E-01	2.4994E-02	3.5708E-01	4.9731E-03	-5.9789E-02	4.7766E-03

TEST 300

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=     8.0100
BEAM AT MIDSHIP=     3.2400

DISPLACED VOLUME/(L/2)**3=    .126131E+00
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .132203E+01
VERTICAL CENTER OF BOYANCY/L=  -.287734E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .231317E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .226564E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .300134E+01
PITCH-PITCH RESTORING COEFFICIENT=    .215532E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .670000E+00
TOTAL MASS=      .0070
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .132500E+00
(YAW-RADIUS OF GYRATION/L)**2=    .132500E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.114	1.7747E-01	5.4179E-01	4.3666E+00	2.0241E-02	4.2079E-01	2.3165E-02	5.8015E-01	3.5285E-02	-6.9126E-02	-5.4884E-04
1.293	1.6228E-01	5.5586E-01	3.8872E+00	2.0487E-02	3.7657E-01	2.3753E-02	5.2156E-01	3.5837E-02	-7.0764E-02	-4.6944E-04
1.473	1.5153E-01	5.5482E-01	3.5299E+00	2.0362E-02	3.4309E-01	2.3727E-02	4.7677E-01	3.4547E-02	-7.0179E-02	-2.2123E-04
1.652	1.4407E-01	5.3520E-01	3.2621E+00	1.9804E-02	3.1749E-01	2.2955E-02	4.4102E-01	3.1248E-02	-6.6955E-02	1.7967E-04
1.832	1.3908E-01	4.9918E-01	3.0623E+00	1.8874E-02	2.9781E-01	2.1538E-02	4.1231E-01	2.6523E-02	-6.1466E-02	6.4527E-04
2.011	1.3598E-01	4.5304E-01	2.9149E+00	1.7720E-02	2.8269E-01	1.9724E-02	3.8897E-01	2.1338E-02	-5.4676E-02	1.0669E-03
2.191	1.3434E-01	4.0370E-01	2.8087E+00	1.6562E-02	2.7113E-01	1.7791E-02	3.6964E-01	1.6515E-02	-4.7458E-02	1.3722E-03
2.370	1.3381E-01	3.5627E-01	2.7351E+00	1.5342E-02	2.6240E-01	1.5917E-02	3.5409E-01	1.2487E-02	-4.0656E-02	1.5417E-03
2.550	1.3411E-01	3.1354E-01	2.6875E+00	1.4309E-02	2.5593E-01	1.4210E-02	3.4113E-01	9.3520E-03	-3.4618E-02	1.5922E-03
2.729	1.3804E-01	2.7651E-01	2.6724E+00	1.3429E-02	2.5229E-01	1.2707E-02	3.2731E-01	7.0279E-03	-2.9480E-02	1.5541E-03
2.909	1.4146E-01	2.4516E-01	2.7071E+00	1.2763E-02	2.5685E-01	1.1413E-02	3.0993E-01	5.3703E-03	-2.5224E-02	1.4572E-03
3.089	1.4470E-01	2.1899E-01	2.7986E+00	1.2117E-02	2.5059E-01	1.0311E-02	2.9225E-01	4.2349E-03	-2.1761E-02	1.3256E-03
3.268	1.4750E-01	1.9737E-01	2.8974E+00	1.1652E-02	2.5056E-01	9.3810E-03	2.8095E-01	3.5017E-03	-1.8981E-02	1.1761E-03
3.448	1.4980E-01	1.8442E-01	2.9819E+00	1.1453E-02	2.5086E-01	8.7299E-03	2.7470E-01	3.8179E-03	-1.7405E-02	9.1864E-04
3.627	1.5178E-01	1.7540E-01	3.0664E+00	1.1456E-02	2.5209E-01	8.1674E-03	2.7524E-01	4.1502E-03	-1.6556E-02	6.8757E-04
3.807	1.5839E-01	1.6783E-01	3.1368E+00	1.1524E-02	2.5406E-01	7.6900E-03	2.7443E-01	4.4356E-03	-1.5953E-02	4.8890E-04
3.986	1.6335E-01	1.6114E-01	3.1945E+00	1.1620E-02	2.5648E-01	7.2675E-03	2.7780E-01	4.6158E-03	-1.5514E-02	3.4409E-04
4.166	1.6866E-01	1.5508E-01	3.2627E+00	1.1732E-02	2.6015E-01	6.8565E-03	2.8070E-01	4.7142E-03	-1.5182E-02	2.4778E-04
4.345	1.7258E-01	1.4945E-01	3.3093E+00	1.1798E-02	2.6321E-01	6.5582E-03	2.8394E-01	4.7862E-03	-1.4851E-02	1.6552E-04
4.525	1.7544E-01	1.4425E-01	3.3475E+00	1.1848E-02	2.6654E-01	6.2566E-03	2.8951E-01	4.8149E-03	-1.4557E-02	1.0723E-04
4.704	1.7740E-01	1.3939E-01	3.3731E+00	1.1864E-02	2.6928E-01	5.9796E-03	2.9474E-01	4.8282E-03	-1.4264E-02	5.7196E-05
4.884	1.7866E-01	1.3618E-01	3.3939E+00	1.1915E-02	2.7233E-01	5.8047E-03	3.0198E-01	5.1837E-03	-1.4132E-02	-1.4700E-05
5.063	1.7931E-01	1.3306E-01	3.4034E+00	1.1935E-02	2.7479E-01	5.6384E-03	3.0769E-01	5.4792E-03	-1.3982E-02	-7.6693E-05
5.243	1.7950E-01	1.3005E-01	3.4098E+00	1.1940E-02	2.7754E-01	5.4817E-03	3.1485E-01	5.7207E-03	-1.3837E-02	-1.2198E-04
5.422	1.8020E-01	1.2714E-01	3.4229E+00	1.1922E-02	2.8014E-01	5.3325E-03	3.2128E-01	5.9197E-03	-1.3680E-02	-1.6123E-04
5.602	1.8050E-01	1.2432E-01	3.4337E+00	1.1885E-02	2.8248E-01	5.1905E-03	3.2562E-01	6.0826E-03	-1.3515E-02	-1.9523E-04
5.781	1.8046E-01	1.2161E-01	3.4415E+00	1.1834E-02	2.8447E-01	5.0552E-03	3.2869E-01	6.2148E-03	-1.3344E-02	-2.2467E-04
5.961	1.8011E-01	1.1910E-01	3.4434E+00	1.1781E-02	2.8604E-01	4.9315E-03	3.3130E-01	6.2962E-03	-1.3189E-02	-2.4588E-04
6.140	1.7950E-01	1.1939E-01	3.4404E+00	1.1762E-02	2.8725E-01	4.9497E-03	3.3353E-01	6.9224E-03	-1.3258E-02	-3.0805E-04
6.320	1.7867E-01	1.1943E-01	3.4329E+00	1.1736E-02	2.8815E-01	4.9541E-03	3.3556E-01	7.4785E-03	-1.3296E-02	-3.6329E-04
6.499	1.7768E-01	1.1928E-01	3.4236E+00	1.1697E-02	2.8888E-01	4.9505E-03	3.3715E-01	7.9635E-03	-1.3311E-02	-4.1191E-04
6.679	1.7656E-01	1.1934E-01	3.4132E+00	1.1660E-02	2.8947E-01	4.9431E-03	3.3854E-01	8.4192E-03	-1.3349E-02	-4.5868E-04
6.858	1.7588E-01	1.1926E-01	3.4024E+00	1.1614E-02	2.9007E-01	4.9300E-03	3.3915E-01	8.8186E-03	-1.3369E-02	-5.0036E-04
7.038	1.7504E-01	1.1927E-01	3.3891E+00	1.1571E-02	2.9051E-01	4.9138E-03	3.3974E-01	9.1883E-03	-1.3404E-02	-5.4040E-04
7.217	1.7408E-01	1.1914E-01	3.3738E+00	1.1521E-02	2.9082E-01	4.8934E-03	3.4035E-01	9.5104E-03	-1.3420E-02	-5.7604E-04
7.397	1.7301E-01	1.1888E-01	3.3570E+00	1.1466E-02	2.9105E-01	4.8694E-03	3.4104E-01	9.7901E-03	-1.3417E-02	-6.0799E-04
7.576	1.7187E-01	1.1851E-01	3.3416E+00	1.1408E-02	2.9127E-01	4.8426E-03	3.4191E-01	1.0032E-02	-1.3398E-02	-6.3703E-04
7.756	1.7068E-01	1.1835E-01	3.3260E+00	1.1356E-02	2.9157E-01	4.8213E-03	3.4309E-01	1.0193E-02	-1.3404E-02	-6.5775E-04
7.936	1.6966E-01	1.2066E-01	3.3380E+00	1.1345E-02	2.9230E-01	4.9978E-03	3.4691E-01	1.1039E-02	-1.3631E-02	-7.4103E-04
8.115	1.6947E-01	1.2195E-01	3.3343E+00	1.1328E-02	2.9406E-01	5.1634E-03	3.5108E-01	1.1808E-02	-1.3770E-02	-8.3041E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(NF)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.114	1.7103E-01	7.7104E-02	5.3191E+00	1.9791E-03	4.9072E-01	3.1616E-03	6.4277E-01	7.8890E-03	-1.1421E-02	-5.9497E-04
1.293	1.7362E-01	1.4932E-01	5.5279E+00	3.7387E-03	5.1490E-01	6.1176E-03	6.8441E-01	1.5197E-02	-2.1822E-02	-1.1002E-03
1.473	1.7230E-01	2.5113E-01	5.6331E+00	6.1524E-03	5.3076E-01	1.0274E-02	7.1630E-01	2.4799E-02	-3.6234E-02	-1.7042E-03
1.652	1.6703E-01	3.7356E-01	5.6525E+00	8.9911E-03	5.3864E-01	1.5259E-02	7.4014E-01	3.5462E-02	-5.3269E-02	-2.2260E-03
1.832	1.6089E-01	5.0080E-01	5.6038E+00	1.1885E-02	5.4096E-01	2.0447E-02	7.5720E-01	4.5056E-02	-7.0641E-02	-2.4701E-03
2.011	1.5208E-01	6.1761E-01	5.4956E+00	1.4482E-02	5.3833E-01	2.5254E-02	7.6841E-01	5.2086E-02	-8.6202E-02	-2.3412E-03
2.191	1.4193E-01	7.1477E-01	5.3329E+00	1.6562E-02	5.3159E-01	2.9341E-02	7.7449E-01	5.6112E-02	-9.8673E-02	-1.8729E-03
2.370	1.3090E-01	7.8954E-01	5.1377E+00	1.8053E-02	5.2146E-01	3.2605E-02	7.7599E-01	5.7493E-02	-1.0770E-01	-1.1736E-03
2.550	1.1938E-01	8.4337E-01	4.9122E+00	1.8987E-02	5.0856E-01	3.5093E-02	7.7345E-01	5.6895E-02	-1.1354E-01	-3.6022E-04
2.729	1.0881E-01	8.7948E-01	4.6671E+00	1.9447E-02	4.9362E-01	3.6913E-02	7.6669E-01	5.4961E-02	-1.1671E-01	4.7741E-04
2.909	9.8489E-02	9.0132E-01	4.4127E+00	1.9526E-02	4.7736E-01	3.8180E-02	7.5509E-01	5.2181E-02	-1.1774E-01	1.2032E-03
3.088	8.8644E-02	9.1191E-01	4.1637E+00	1.9312E-02	4.6030E-01	3.9000E-02	7.3799E-01	4.8890E-02	-1.1712E-01	2.0286E-03
3.268	7.9393E-02	9.1365E-01	3.9267E+00	1.8876E-02	4.4260E-01	3.9456E-02	7.1732E-01	4.5297E-02	-1.1522E-01	2.7046E-03
3.448	7.0798E-02	9.0041E-01	3.7027E+00	1.8310E-02	4.2450E-01	3.9354E-02	6.9418E-01	4.0210E-02	-1.1232E-01	3.2017E-03
3.627	6.2859E-02	8.7746E-01	3.4929E+00	1.7659E-02	4.0628E-01	3.9112E-02	6.6967E-01	3.5603E-02	-1.0879E-01	3.6995E-03
3.807	5.7961E-02	8.5137E-01	3.2980E+00	1.6954E-02	3.8829E-01	3.8551E-02	6.4295E-01	3.1058E-02	-1.0502E-01	4.0257E-03
3.986	5.3449E-02	3.2538E-01	3.1147E+00	1.6259E-02	3.7076E-01	3.7937E-02	6.1674E-01	2.7386E-02	-1.0137E-01	4.2543E-03
4.166	4.9459E-02	8.0017E-01	2.9539E+00	1.5582E-02	3.5426E-01	3.7244E-02	5.9439E-01	2.4464E-02	-9.7857E-02	4.4104E-03
4.345	4.5834E-02	7.7690E-01	2.7960E+00	1.4926E-02	3.3801E-01	3.6587E-02	5.7164E-01	2.1837E-02	-9.4633E-02	4.5192E-03
4.525	4.2471E-02	7.5479E-01	2.6545E+00	1.4283E-02	3.2274E-01	3.5887E-02	5.5060E-01	1.9677E-02	-9.1520E-02	4.5745E-03
4.704	3.9337E-02	7.3429E-01	2.5207E+00	1.3667E-02	3.0782E-01	3.5227E-02	5.2959E-01	1.7712E-02	-8.8594E-02	4.6024E-03
4.884	3.6433E-02	7.1052E-01	2.3967E+00	1.3087E-02	2.9372E-01	3.4302E-02	5.0983E-01	1.4777E-02	-8.5468E-02	4.7818E-03
5.063	3.3717E-02	6.8841E-01	2.2795E+00	1.2533E-02	2.8604E-01	3.3435E-02	4.9041E-01	1.2066E-02	-8.2534E-02	4.9339E-03
5.243	3.1345E-02	6.6760E-01	2.1895E+00	1.2011E-02	2.7101E-01	3.2582E-02	4.8052E-01	9.6376E-03	-7.9830E-02	5.0874E-03
5.422	2.9160E-02	6.4815E-01	2.0859E+00	1.1515E-02	2.6195E-01	3.1783E-02	4.6876E-01	7.3765E-03	-7.7298E-02	5.2227E-03
5.602	2.7103E-02	6.2994E-01	1.9884E+00	1.1043E-02	2.5310E-01	3.1031E-02	4.5723E-01	5.2669E-03	-7.4898E-02	5.3414E-03
5.781	2.5128E-02	6.1285E-01	1.8911E+00	1.0592E-02	2.4431E-01	3.0322E-02	4.4678E-01	3.2953E-03	-7.2640E-02	5.4448E-03
5.961	2.3266E-02	5.9619E-01	1.7989E+00	1.0147E-02	2.3575E-01	2.9627E-02	4.3638E-01	1.5728E-03	-7.0389E-02	5.5101E-03
6.140	2.1493E-02	5.7954E-01	1.7096E+00	9.7299E-03	2.2736E-01	2.8836E-02	4.2643E-01	-2.3973E-04	-6.8246E-02	5.5317E-03
6.320	1.9721E-02	5.6415E-01	1.6125E+00	9.3557E-03	2.1876E-01	2.8117E-02	4.1886E-01	-2.0612E-03	-6.6291E-02	5.5736E-03
6.499	1.8576E-02	5.4960E-01	1.5903E+00	8.9964E-03	2.1216E-01	2.7446E-02	3.9365E-01	-3.7738E-03	-6.4429E-02	5.6050E-03
6.679	1.7025E-02	5.3348E-01	1.5090E+00	8.6237E-03	2.0357E-01	2.6776E-02	3.8248E-01	-5.5939E-03	-6.2431E-02	5.6457E-03
6.858	1.5626E-02	5.1696E-01	1.4307E+00	8.2481E-03	1.9514E-01	2.6132E-02	3.7136E-01	-7.4193E-03	-6.0422E-02	5.6838E-03
7.038	1.4289E-02	4.8961E-01	1.3555E+00	7.7865E-03	1.8687E-01	2.5426E-02	3.6036E-01	-1.0161E-02	-5.7534E-02	5.7950E-03
7.217	1.3010E-02	4.6400E-01	1.2829E+00	7.3412E-03	1.7869E-01	2.4750E-02	3.4533E-01	-1.2757E-02	-5.4766E-02	5.8884E-03
7.397	1.1781E-02	4.3943E-01	1.2125E+00	6.9098E-03	1.7051E-01	2.4162E-02	3.3818E-01	-1.5216E-02	-5.2103E-02	5.9617E-03
7.576	1.0495E-02	4.1599E-01	1.1319E+00	6.4889E-03	1.6220E-01	2.3478E-02	3.2627E-01	-1.7547E-02	-4.9527E-02	6.0106E-03
7.756	9.8879E-03	3.9186E-01	1.1279E+00	6.0254E-03	1.5348E-01	2.2830E-02	3.1431E-01	-1.9473E-02	-4.6792E-02	5.9910E-03
7.936	9.5229E-03	3.1702E-01	1.1509E+00	5.2315E-03	1.4611E-01	1.8349E-02	3.1644E-01	-3.4778E-02	-4.0290E-02	6.8828E-03
8.115	8.5835E-03	3.6719E-01	1.0198E+00	5.2347E-03	1.3237E-01	2.5974E-02	2.8962E-01	-9.0953E-03	-4.1988E-02	4.8080E-03

TEST 500

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   11.4600
BEAM AT MIDSHIP=    2.9400

DISPLACED VOLUME/(L/2)**3=   .433013E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=   .119369E+01
VERTICAL CENTER OF BOYANCY/L=  -.125384E-01
METACENTER HEIGHT OVER WATE-PLANE/L=   .213285E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .442224E+02
HEAVE-PITCH RESTORING COEFFICIENT=   .343434E+01
PITCH-PITCH RESTORING COEFFICIENT=   .369392E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .977000E+00
TOTAL MASS=      .0077
(ROLL-RADIUS OF GYRATION/L)**2=   .166000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .115900E+00
(YAW-RADIUS OF GYRATION/L)**2=   .115900E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 35).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(NI)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.332	7.5955E-03	3.7430E-01	5.9617E+00	1.2649E-02	4.9774E-01	2.4536E-02	4.4916E-01	1.9944E-02	-4.5993E-02	-6.9684E-04
1.602	6.6228E-03	3.8855E-01	5.1824E+00	1.3080E-02	4.3344E-01	2.5476E-02	3.9462E-01	2.0652E-02	-4.7715E-02	-6.8700E-04
1.872	5.9294E-03	3.9302E-01	4.6312E+00	1.3014E-02	3.6785E-01	2.5798E-02	3.5468E-01	2.0291E-02	-4.7804E-02	-5.7810E-04
2.141	5.4273E-03	3.8365E-01	4.2420E+00	1.2584E-02	3.5511E-01	2.5236E-02	3.2468E-01	1.8607E-02	-4.5748E-02	-3.6958E-04
2.411	5.0616E-03	3.6108E-01	3.9636E+00	1.1849E-02	3.3154E-01	2.3829E-02	3.0166E-01	1.5898E-02	-4.1780E-02	-1.1428E-04
2.681	4.7963E-03	3.2983E-01	3.7688E+00	1.0955E-02	3.1474E-01	2.1857E-02	2.8376E-01	1.2801E-02	-3.6685E-02	1.1775E-04
2.950	4.6068E-03	2.9528E-01	3.6370E+00	1.0049E-02	3.0307E-01	1.9661E-02	2.6572E-01	9.8797E-03	-3.1315E-02	2.8137E-04
3.220	4.4757E-03	2.6147E-01	3.5537E+00	9.2306E-03	2.9534E-01	1.7496E-02	2.5873E-01	7.4310E-03	-2.6273E-02	3.6743E-04
3.490	4.3960E-03	2.3062E-01	3.5077E+00	8.5426E-03	2.9066E-01	1.5505E-02	2.5022E-01	5.5261E-03	-2.1857E-02	3.8860E-04
3.759	4.3398E-03	2.0358E-01	3.4902E+00	7.9918E-03	2.8834E-01	1.3746E-02	2.4379E-01	4.1173E-03	-1.8152E-02	3.6391E-04
4.029	4.3173E-03	1.8040E-01	3.4944E+00	7.5657E-03	2.8784E-01	1.2224E-02	2.3916E-01	3.1183E-03	-1.5124E-02	3.1059E-04
4.299	4.3562E-03	1.6478E-01	3.5776E+00	7.2452E-03	2.9411E-01	1.0926E-02	2.1781E-01	2.4434E-03	-1.2692E-02	2.4163E-04
4.569	4.4145E-03	1.4623E-01	3.6993E+00	7.1665E-03	3.0043E-01	1.0011E-02	1.9771E-01	2.6045E-03	-1.1206E-02	3.4900E-05
4.838	4.5397E-03	1.3446E-01	3.9182E+00	7.1986E-03	3.0964E-01	9.2135E-03	1.7511E-01	2.8265E-03	-1.0216E-02	-1.5273E-04
5.108	4.6498E-03	1.2445E-01	4.0910E+00	7.2666E-03	3.1740E-01	8.5129E-03	1.6256E-01	3.0027E-03	-9.4936E-03	-2.9421E-04
5.378	4.7570E-03	1.1573E-01	4.2600E+00	7.4354E-03	3.2582E-01	7.4756E-03	1.6322E-01	3.1944E-03	-9.0667E-03	-3.7512E-04
5.647	4.8587E-03	1.0804E-01	4.4050E+00	7.5689E-03	3.3440E-01	7.3124E-03	1.7246E-01	3.3501E-03	-8.7093E-03	-4.2786E-04
5.917	4.9464E-03	1.0123E-01	4.5186E+00	7.6714E-03	3.4232E-01	6.8153E-03	1.8451E-01	3.4665E-03	-8.4083E-03	-4.5747E-04
6.187	5.0264E-03	9.5184E-02	4.6062E+00	7.7463E-03	3.4978E-01	6.3764E-03	1.9851E-01	3.5469E-03	-8.1511E-03	-4.6886E-04
6.456	5.0845E-03	8.9771E-02	4.6644E+00	7.7961E-03	3.5505E-01	5.9846E-03	2.0998E-01	3.6039E-03	-7.9256E-03	-4.6748E-04
6.726	5.1299E-03	8.4899E-02	4.7048E+00	7.8148E-03	3.5945E-01	5.6329E-03	2.1744E-01	3.6422E-03	-7.7098E-03	-4.6441E-04
6.996	5.1625E-03	8.0495E-02	4.7261E+00	7.8090E-03	3.6237E-01	5.3159E-03	2.2359E-01	3.6652E-03	-7.5036E-03	-4.6017E-04
7.265	5.1848E-03	7.6687E-02	4.7321E+00	7.7940E-03	3.6411E-01	5.0336E-03	2.2848E-01	3.7047E-03	-7.3329E-03	-4.5892E-04
7.535	5.1990E-03	7.3348E-02	4.7259E+00	7.7720E-03	3.6490E-01	4.7770E-03	2.3289E-01	3.7304E-03	-7.1878E-03	-4.5638E-04
7.805	5.2091E-03	7.0280E-02	4.7141E+00	7.7356E-03	3.6501E-01	4.5431E-03	2.3698E-01	3.7448E-03	-7.0456E-03	-4.5272E-04
8.074	5.2140E-03	6.7450E-02	4.6941E+00	7.6879E-03	3.6451E-01	4.3292E-03	2.4039E-01	3.7475E-03	-6.9066E-03	-4.4817E-04
8.344	5.2163E-03	6.4834E-02	4.6696E+00	7.6314E-03	3.6386E-01	4.1332E-03	2.4415E-01	3.7426E-03	-6.7712E-03	-4.4293E-04
8.614	5.2182E-03	6.2777E-02	4.6397E+00	7.5818E-03	3.6280E-01	3.9725E-03	2.4737E-01	3.8146E-03	-6.6827E-03	-4.4783E-04
8.883	5.2152E-03	6.0847E-02	4.6055E+00	7.5256E-03	3.6143E-01	3.8238E-03	2.5018E-01	3.8704E-03	-6.5927E-03	-4.4959E-04
9.153	5.2156E-03	5.9034E-02	4.5683E+00	7.4645E-03	3.5987E-01	3.6860E-03	2.5275E-01	3.9123E-03	-6.5019E-03	-4.5892E-04
9.423	5.2211E-03	5.8069E-02	4.5289E+00	7.4156E-03	3.5827E-01	3.6382E-03	2.5530E-01	4.1848E-03	-6.4823E-03	-4.7487E-04
9.692	5.2389E-03	5.7023E-02	4.4887E+00	7.3648E-03	3.5684E-01	3.5861E-03	2.5821E-01	4.3868E-03	-6.4487E-03	-4.9398E-04
9.962	5.2875E-03	5.6215E-02	4.4497E+00	7.3121E-03	3.5613E-01	3.5471E-03	2.6241E-01	4.4607E-03	-6.4501E-03	-5.0898E-04
10.232	5.4355E-03	5.5296E-02	4.4186E+00	7.3000E-03	3.5861E-01	3.5263E-03	2.7134E-01	4.4255E-03	-6.3852E-03	-5.0437E-04
10.501	6.4303E-03	5.5666E-02	4.4759E+00	7.3662E-03	3.8366E-01	3.6120E-03	3.2410E-01	4.4649E-03	-6.3523E-03	-5.6662E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	F(1,1)	F(2,2)	F(3,3)	F(4,4)	F(5,5)	F(6,6)	F(3,5)	F(2,6)	F(2,4)	F(4,6)
1.332	1.0557E-02	4.3955E-02	8.4779E+00	1.2391E-03	6.9786E-01	2.8114E-03	5.8885E-01	3.8035E-03	-6.9826E-03	-2.8438E-04
1.602	1.1209E-02	1.0047E-01	8.9388E+00	2.7323E-03	7.3836E-01	6.4371E-03	6.3514E-01	6.6095E-03	-1.5672E-02	-6.2047E-04
1.872	1.1582E-02	1.8950E-01	9.1630E+00	4.9572E-03	7.5979E-01	1.2165E-02	6.6773E-01	1.5847E-02	-2.8976E-02	-1.0736E-03
2.141	1.1732E-02	3.0515E-01	9.1590E+00	7.6628E-03	7.6605E-01	1.9633E-02	6.8545E-01	2.4457E-02	-4.5679E-02	-1.5039E-03
2.411	1.1704E-02	4.3204E-01	9.0839E+00	1.0396E-02	7.6010E-01	2.7870E-02	7.0228E-01	3.2611E-02	-6.3241E-02	-1.7380E-03
2.681	1.1530E-02	5.5345E-01	8.8480E+00	1.2732E-02	7.4434E-01	3.5818E-02	7.0757E-01	3.8813E-02	-7.9113E-02	-1.6856E-03
2.950	1.1248E-02	6.5832E-01	8.5171E+00	1.4442E-02	7.2076E-01	4.2769E-02	7.0639E-01	4.2520E-02	-9.1766E-02	-1.3732E-03
3.220	1.0858E-02	7.4259E-01	8.1136E+00	1.5491E-02	6.9108E-01	4.9452E-02	6.9923E-01	4.3959E-02	-1.0079E-01	-8.9066E-04
3.490	1.0403E-02	8.0684E-01	7.6570E+00	1.5964E-02	6.5680E-01	5.2887E-02	6.8768E-01	4.3659E-02	-1.0646E-01	-3.2967E-04
3.759	9.8944E-03	8.5365E-01	7.1642E+00	1.5981E-02	6.1922E-01	5.6221E-02	6.7058E-01	4.2143E-02	-1.0935E-01	2.4374E-04
4.029	9.3469E-03	8.8602E-01	6.6486E+00	1.5662E-02	5.7939E-01	5.8633E-02	6.5062E-01	3.9818E-02	-1.1003E-01	7.9164E-04
4.299	8.7849E-03	9.0664E-01	6.1394E+00	1.5103E-02	5.4051E-01	6.0288E-02	6.2183E-01	3.6968E-02	-1.0859E-01	1.2978E-03
4.569	8.2147E-03	9.0569E-01	5.6395E+00	1.4386E-02	5.0159E-01	6.0194E-02	5.8865E-01	3.0192E-02	-1.0619E-01	1.8790E-03
4.838	7.6680E-03	8.9602E-01	5.1557E+00	1.3624E-02	4.6500E-01	5.9928E-02	5.4699E-01	2.3981E-02	-1.0278E-01	2.2693E-03
5.108	7.1427E-03	8.8319E-01	4.8004E+00	1.2872E-02	4.2993E-01	5.9539E-02	5.0572E-01	1.8959E-02	-9.9251E-02	2.4829E-03
5.378	6.6361E-03	8.6632E-01	4.4411E+00	1.2260E-02	3.9695E-01	5.8936E-02	4.6613E-01	1.5463E-02	-9.5841E-02	2.5929E-03
5.647	6.1547E-03	8.5006E-01	4.1228E+00	1.1695E-02	3.6661E-01	5.8244E-02	4.3067E-01	1.2680E-02	-9.2677E-02	2.6517E-03
5.917	5.6917E-03	8.3437E-01	3.8289E+00	1.1174E-02	3.3795E-01	5.7460E-02	3.9623E-01	1.0526E-02	-8.9749E-02	2.6782E-03
6.187	5.3076E-03	8.1926E-01	3.5995E+00	1.0695E-02	3.1937E-01	5.6581E-02	3.8195E-01	8.9166E-03	-8.7058E-02	2.6907E-03
6.456	5.0414E-03	8.0491E-01	3.4110E+00	1.0258E-02	3.0767E-01	5.5647E-02	3.7964E-01	7.6975E-03	-8.4616E-02	2.7139E-03
6.726	4.7824E-03	7.9188E-01	3.2256E+00	9.8520E-03	2.9495E-01	5.4781E-02	3.8150E-01	6.5910E-03	-8.2356E-02	2.7275E-03
6.996	4.5764E-03	7.7944E-01	3.0538E+00	9.4754E-03	2.8303E-01	5.3973E-02	3.8287E-01	5.5851E-03	-8.0256E-02	2.7325E-03
7.265	4.3030E-03	7.6702E-01	2.8943E+00	9.1159E-03	2.7184E-01	5.3191E-02	3.8386E-01	4.5072E-03	-7.8097E-02	2.7609E-03
7.535	4.0916E-03	7.5457E-01	2.7458E+00	8.7685E-03	2.6133E-01	5.2456E-02	3.8456E-01	3.5194E-03	-7.5894E-02	2.7809E-03
7.805	3.8599E-03	7.4256E-01	2.5876E+00	8.4436E-03	2.5101E-01	5.1764E-02	3.8212E-01	2.6158E-03	-7.3831E-02	2.7926E-03
8.074	3.6469E-03	7.3209E-01	2.4366E+00	8.1392E-03	2.4127E-01	5.1110E-02	3.7964E-01	1.7880E-03	-7.1893E-02	2.7962E-03
8.344	3.4542E-03	7.2190E-01	2.3109E+00	7.8531E-03	2.3363E-01	5.0489E-02	3.8111E-01	1.0291E-03	-7.0065E-02	2.7918E-03
8.614	3.2682E-03	7.1000E-01	2.1896E+00	7.5690E-03	2.2633E-01	4.9779E-02	3.8222E-01	-1.8657E-04	-6.8137E-02	2.9237E-03
8.883	3.0875E-03	6.9583E-01	2.0781E+00	7.3004E-03	2.1927E-01	4.9104E-02	3.8291E-01	-1.3140E-03	-6.6307E-02	2.8427E-03
9.153	2.8987E-03	6.8336E-01	1.9664E+00	7.0452E-03	2.1235E-01	4.8461E-02	3.9304E-01	-2.3609E-03	-6.4557E-02	2.8458E-03
9.423	2.7078E-03	6.7100E-01	1.8623E+00	6.7383E-03	2.0535E-01	4.7163E-02	3.8231E-01	-5.4079E-03	-6.2397E-02	2.9813E-03
9.692	2.4554E-03	6.6216E-01	1.7612E+00	6.4420E-03	1.9789E-01	4.5867E-02	3.8565E-01	-8.4569E-03	-6.0279E-02	3.0773E-03
9.962	2.2246E-03	6.1476E-01	1.6593E+00	5.7774E-03	1.8857E-01	4.1367E-02	3.7450E-01	-1.9084E-02	-5.6959E-02	2.4795E-03
10.232	1.7551E-03	6.4177E-01	1.5479E+00	5.8501E-03	1.7463E-01	4.5051E-02	3.5885E-01	-5.0903E-03	-5.5945E-02	2.0187E-03
10.501	-1.0678E-03	5.9668E-01	5.9711E-01	4.6103E-03	4.4767E-02	4.0295E-02	1.0060E-01	-3.3925E-03	-4.7955E-02	-2.7816E-04

TEST 700

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=     9.1080
BEAM AT MIDSHIP=     2.9500

DISPLACED VOLUME/(L/2)**3=    .860281E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .784474E+00
VERTICAL CENTER OF BOYANCY/L=  -.229437E-01
METACENTER HEIGHT OVER WATER-PLANE/L=    .195065E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .276093E+02
HEAVE-PITCH RESTORING COEFFICIENT=  -.923073E+01
PITCH-PITCH RESTORING COEFFICIENT=    .244040E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .686000E+00
TOTAL MASS=       .0077
(ROLL-RADIUS OF GYRATION/L)**2=    .180000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .316000E+00
(YAW-RADIUS OF GYRATION/L)**2=    .316000E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 39).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(NF)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.188	5.2786E-02	5.2780E-01	4.5477E+00	1.4247E-02	4.1803E-01	1.9912E-02	-6.0213E-01	-2.7566E-02	-5.0763E-02	-1.0837E-03
1.391	4.6182E-02	5.4654E-01	4.0237E+00	1.4451E-02	3.7188E-01	2.0635E-02	-5.3851E-01	-2.8738E-02	-5.2408E-02	-1.1190E-03
1.594	4.1244E-02	5.5185E-01	3.6374E+00	1.4415E-02	3.3734E-01	2.0964E-02	-4.9104E-01	-2.8907E-02	-5.2408E-02	-1.1926E-03
1.798	3.7455E-02	5.3811E-01	3.3511E+00	1.4077E-02	3.1119E-01	2.0699E-02	-4.5408E-01	-2.7624E-02	-5.0251E-02	-1.3100E-03
2.001	3.4491E-02	5.0532E-01	3.1397E+00	1.3467E-02	2.9125E-01	1.9799E-02	-4.2507E-01	-2.4902E-02	-4.6074E-02	-1.4522E-03
2.204	3.2261E-02	4.5905E-01	2.9860E+00	1.2683E-02	2.7605E-01	1.8371E-02	-4.0201E-01	-2.1230E-02	-4.0589E-02	-1.5822E-03
2.407	3.0572E-02	4.0699E-01	2.8772E+00	1.1844E-02	2.6454E-01	1.6669E-02	-3.8353E-01	-1.7273E-02	-3.4677E-02	-1.6666E-03
2.611	2.9320E-02	3.5556E-01	2.8040E+00	1.1043E-02	2.5592E-01	1.4900E-02	-3.6862E-01	-1.3558E-02	-2.9029E-02	-1.6907E-03
2.814	2.8423E-02	3.0861E-01	2.7590E+00	1.0334E-02	2.4962E-01	1.3216E-02	-3.5660E-01	-1.0366E-02	-2.4032E-02	-1.6579E-03
3.017	2.7816E-02	2.6773E-01	2.7360E+00	9.7371E-03	2.4517E-01	1.1695E-02	-3.4656E-01	-7.7780E-03	-1.9824E-02	-1.5813E-03
3.221	2.7851E-02	2.3313E-01	2.7875E+00	9.2508E-03	2.4347E-01	1.0364E-02	-3.3251E-01	-5.7584E-03	-1.6391E-02	-1.4757E-03
3.424	2.8664E-02	2.0433E-01	2.8930E+00	8.8643E-03	2.4431E-01	9.2214E-03	-3.1436E-01	-4.2273E-03	-1.3651E-02	-1.3541E-03
3.627	2.9389E-02	1.8059E-01	2.9870E+00	8.5628E-03	2.4521E-01	8.2520E-03	-3.0257E-01	-3.0966E-03	-1.1498E-02	-1.2261E-03
3.830	3.0985E-02	1.6453E-01	3.0904E+00	8.4703E-03	2.4798E-01	7.4775E-03	-2.9337E-01	-2.5444E-03	-1.0324E-02	-1.0594E-03
4.034	3.2395E-02	1.5306E-01	3.1823E+00	8.5322E-03	2.5096E-01	6.8521E-03	-2.9087E-01	-2.2642E-03	-9.7834E-03	-9.0853E-04
4.237	3.3900E-02	1.4314E-01	3.2626E+00	8.5971E-03	2.5431E-01	6.3869E-03	-2.9363E-01	-2.0088E-03	-9.3687E-03	-7.9237E-04
4.440	3.4275E-02	1.3489E-01	3.3315E+00	8.6761E-03	2.5811E-01	5.9935E-03	-3.0039E-01	-1.8719E-03	-9.1059E-03	-6.9039E-04
4.644	3.4913E-02	1.2756E-01	3.3862E+00	8.7482E-03	2.6130E-01	5.6495E-03	-3.0595E-01	-1.7273E-03	-8.8982E-03	-6.1661E-04
4.847	3.5356E-02	1.2096E-01	3.4240E+00	8.7873E-03	2.6390E-01	5.3391E-03	-3.1132E-01	-1.6077E-03	-8.6929E-03	-5.5241E-04
5.050	3.5644E-02	1.1491E-01	3.4485E+00	8.8206E-03	2.6604E-01	5.0491E-03	-3.1682E-01	-1.5222E-03	-8.5041E-03	-5.0085E-04
5.254	3.5809E-02	1.0942E-01	3.4623E+00	8.8293E-03	2.6779E-01	4.7861E-03	-3.2154E-01	-1.4802E-03	-8.3181E-03	-4.5547E-04
5.457	3.5940E-02	1.0478E-01	3.4760E+00	8.8434E-03	2.7049E-01	4.5568E-03	-3.2961E-01	-1.4754E-03	-8.1812E-03	-4.1530E-04
5.660	3.5975E-02	1.0051E-01	3.4806E+00	8.8373E-03	2.7259E-01	4.3469E-03	-3.3863E-01	-1.4945E-03	-8.0422E-03	-3.7972E-04
5.863	3.6068E-02	9.7384E-02	3.4993E+00	8.8284E-03	2.7442E-01	4.1660E-03	-3.4460E-01	-1.6042E-03	-7.9638E-03	-3.4083E-04
6.067	3.6061E-02	9.4491E-02	3.5038E+00	8.8068E-03	2.7583E-01	3.9994E-03	-3.5160E-01	-1.7013E-03	-7.8821E-03	-3.0586E-04
6.270	3.6108E-02	9.2059E-02	3.5135E+00	8.7590E-03	2.7709E-01	3.8659E-03	-3.5559E-01	-1.8447E-03	-7.7189E-03	-2.2962E-04
6.473	3.6229E-02	9.0374E-02	3.5260E+00	8.7397E-03	2.7848E-01	3.7575E-03	-3.5744E-01	-2.0739E-03	-7.6772E-03	-1.4731E-04
6.677	3.6276E-02	8.8088E-02	3.5341E+00	8.6886E-03	2.7954E-01	3.6318E-03	-3.5820E-01	-2.1452E-03	-7.5507E-03	-7.9165E-05
6.880	3.6262E-02	8.6915E-02	3.5362E+00	8.6463E-03	2.8026E-01	3.5515E-03	-3.5873E-01	-2.3054E-03	-7.4708E-03	-1.5338E-05
7.083	3.6155E-02	8.5975E-02	3.5331E+00	8.6018E-03	2.8072E-01	3.4952E-03	-3.5911E-01	-2.6861E-03	-7.4052E-03	4.6521E-05
7.286	3.6091E-02	8.5004E-02	3.5291E+00	8.5513E-03	2.8102E-01	3.4395E-03	-3.5851E-01	-2.9412E-03	-7.3354E-03	1.0155E-04
7.490	3.5948E-02	8.3990E-02	3.5196E+00	8.4975E-03	2.8108E-01	3.3824E-03	-3.5503E-01	-3.1595E-03	-7.2619E-03	1.5051E-04
7.693	3.5807E-02	8.7411E-02	3.5393E+00	8.4919E-03	2.8110E-01	3.3345E-03	-3.5851E-01	-3.2829E-03	-7.4913E-03	1.8751E-04
7.896	3.5640E-02	9.0372E-02	3.4972E+00	8.4781E-03	2.8101E-01	3.2870E-03	-3.5804E-01	-3.3902E-03	-7.6878E-03	2.2054E-04
8.100	3.5468E-02	9.2930E-02	3.4861E+00	8.4577E-03	2.8085E-01	3.2400E-03	-3.5762E-01	-3.4829E-03	-7.8554E-03	2.5006E-04
8.303	3.5287E-02	9.5461E-02	3.4745E+00	8.4467E-03	2.8065E-01	3.2019E-03	-3.5705E-01	-3.5105E-03	-8.0366E-03	2.7373E-04
8.506	3.5079E-02	9.7782E-02	3.4635E+00	8.4265E-03	2.8044E-01	3.1710E-03	-3.5678E-01	-3.4591E-03	-8.2130E-03	2.8363E-04
8.710	3.4896E-02	1.0031E-01	3.4472E+00	8.4110E-03	2.8033E-01	3.2063E-03	-3.5723E-01	-3.2985E-03	-8.4518E-03	2.6436E-04
8.913	3.5416E-02	1.0692E-01	3.4427E+00	8.4047E-03	2.8113E-01	3.2511E-03	-3.5456E-01	-3.8079E-03	-8.8574E-03	2.9379E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.188	7.2830E-02	6.8617E-02	5.8232E+00	1.2443E-03	5.1572E-01	2.2177E-03	-7.1884E-01	-4.5019E-03	-8.2844E-03	4.6851E-05
1.391	7.6818E-02	1.4101E-01	6.0787E+00	2.4600E-03	5.4384E-01	4.5805E-03	-7.6448E-01	-5.3989E-03	-1.6510E-02	1.0444E-04
1.594	7.9334E-02	2.4972E-01	6.2072E+00	4.1934E-03	5.6187E-01	8.1915E-03	-7.5754E-01	-1.6835E-02	-2.8606E-02	1.7604E-04
1.798	8.0614E-02	3.8831E-01	6.2311E+00	6.2966E-03	5.7164E-01	1.2929E-02	-8.2162E-01	-2.6269E-02	-4.3524E-02	2.1319E-04
2.001	8.0845E-02	5.3967E-01	6.1686E+00	8.4870E-03	5.7462E-01	1.8315E-02	-8.3728E-01	-3.6266E-02	-5.9224E-02	1.3647E-04
2.204	8.0179E-02	6.8383E-01	6.0355E+00	1.0471E-02	5.7197E-01	2.3708E-02	-8.4621E-01	-4.5177E-02	-7.3517E-02	-1.1029E-04
2.407	7.8749E-02	8.0647E-01	5.8454E+00	1.2053E-02	5.6469E-01	2.9574E-02	-8.4938E-01	-5.1910E-02	-8.4953E-02	-5.2910E-04
2.611	7.6679E-02	9.0183E-01	5.6138E+00	1.3167E-02	5.5361E-01	3.2626E-02	-8.4752E-01	-5.6165E-02	-9.3059E-02	-1.0743E-03
2.814	7.4079E-02	9.7061E-01	5.3428E+00	1.3839E-02	5.3948E-01	3.5801E-02	-8.4123E-01	-5.8197E-02	-9.8049E-02	-1.6829E-03
3.017	7.1054E-02	1.0166E+00	5.0511E+00	1.4139E-02	5.2293E-01	3.8166E-02	-8.3103E-01	-5.8483E-02	-1.0045E-01	-2.2994E-03
3.221	6.7517E-02	1.0442E+00	4.7460E+00	1.4147E-02	5.0453E-01	3.9845E-02	-8.1723E-01	-5.7560E-02	-1.0083E-01	-2.8851E-03
3.424	6.3626E-02	1.0575E+00	4.4506E+00	1.3937E-02	4.8516E-01	4.0964E-02	-7.9823E-01	-5.5641E-02	-9.9691E-02	-3.4176E-03
3.627	5.9926E-02	1.0597E+00	4.1785E+00	1.3568E-02	4.6519E-01	4.1635E-02	-7.7602E-01	-5.3197E-02	-9.7433E-02	-3.8868E-03
3.830	5.6210E-02	1.0389E+00	3.9306E+00	1.3104E-02	4.4514E-01	4.1727E-02	-7.5223E-01	-4.9092E-02	-9.4112E-02	-4.2995E-03
4.034	5.2799E-02	1.0359E+00	3.6984E+00	1.2588E-02	4.2522E-01	4.1266E-02	-7.2669E-01	-4.4792E-02	-9.0250E-02	-4.5970E-03
4.237	4.9671E-02	9.7399E-01	3.4827E+00	1.2057E-02	4.0571E-01	4.0710E-02	-7.0061E-01	-4.1198E-02	-8.6532E-02	-4.8036E-03
4.440	4.6813E-02	9.4115E-01	3.2845E+00	1.1510E-02	3.8698E-01	3.9824E-02	-6.7525E-01	-3.7594E-02	-8.2802E-02	-4.9532E-03
4.644	4.4159E-02	9.1018E-01	3.0987E+00	1.0971E-02	3.6865E-01	3.8914E-02	-6.4940E-01	-3.4624E-02	-7.9260E-02	-5.0395E-03
4.847	4.1687E-02	8.8169E-01	2.9233E+00	1.0448E-02	3.5073E-01	3.8063E-02	-6.2337E-01	-3.1951E-02	-7.5947E-02	-5.0902E-03
5.050	3.9379E-02	8.5534E-01	2.7575E+00	9.9867E-03	3.3323E-01	3.7259E-02	-5.9728E-01	-2.9649E-02	-7.2991E-02	-5.1653E-03
5.254	3.7216E-02	8.3098E-01	2.6002E+00	9.5425E-03	3.1613E-01	3.6507E-02	-5.7124E-01	-2.7354E-02	-7.0224E-02	-5.2168E-03
5.457	3.5399E-02	8.0705E-01	2.4762E+00	9.1540E-03	3.0307E-01	3.5748E-02	-5.5538E-01	-2.5112E-02	-6.7731E-02	-5.3199E-03
5.660	3.3695E-02	7.8482E-01	2.3629E+00	8.7818E-03	2.9038E-01	3.5039E-02	-5.3941E-01	-2.3039E-02	-6.5396E-02	-5.4057E-03
5.863	3.2062E-02	7.5979E-01	2.2380E+00	8.4066E-03	2.7799E-01	3.4313E-02	-5.2267E-01	-2.0614E-02	-6.2864E-02	-5.5149E-03
6.067	3.0408E-02	7.3511E-01	2.1196E+00	8.0416E-03	2.6596E-01	3.3612E-02	-5.0614E-01	-1.8211E-02	-6.0480E-02	-5.6074E-03
6.270	2.8875E-02	7.0314E-01	2.0165E+00	7.5487E-03	2.5615E-01	3.2593E-02	-4.9481E-01	-1.5067E-02	-5.7385E-02	-5.5269E-03
6.473	2.7299E-02	7.1591E-01	1.9205E+00	7.4573E-03	2.4671E-01	3.2174E-02	-4.8171E-01	-1.6933E-02	-5.6582E-02	-5.2131E-03
6.677	2.5810E-02	6.9807E-01	1.8277E+00	7.1610E-03	2.3750E-01	3.2456E-02	-4.6988E-01	-1.6266E-02	-5.4405E-02	-4.9246E-03
6.880	2.4401E-02	6.6921E-01	1.7366E+00	6.7148E-03	2.2850E-01	3.1421E-02	-4.5863E-01	-1.4944E-02	-5.1959E-02	-4.8390E-03
7.083	2.3053E-02	6.4166E-01	1.6012E+00	6.3466E-03	2.1877E-01	3.0364E-02	-4.5448E-01	-1.1548E-02	-4.9620E-02	-4.7611E-03
7.286	2.1805E-02	6.1447E-01	1.6319E+00	5.9946E-03	2.1194E-01	2.9363E-02	-4.3169E-01	-8.3284E-03	-4.7404E-02	-4.6832E-03
7.490	2.0599E-02	5.9032E-01	1.5190E+00	5.6689E-03	2.0356E-01	2.8533E-02	-4.2147E-01	-5.6399E-03	-4.5359E-02	-4.5846E-03
7.693	1.9651E-02	5.3416E-01	1.4541E+00	5.1818E-03	1.9580E-01	2.7669E-02	-4.0901E-01	-3.8591E-03	-4.1623E-02	-4.4320E-03
7.896	1.8744E-02	4.8089E-01	1.3918E+00	4.7156E-03	1.8819E-01	2.6847E-02	-3.9674E-01	-2.1739E-03	-3.8070E-02	-4.2824E-03
8.100	1.7872E-02	4.3029E-01	1.3266E+00	4.2686E-03	1.8070E-01	2.6064E-02	-3.8426E-01	-5.7735E-04	-3.4686E-02	-4.1351E-03
8.303	1.6961E-02	3.7995E-01	1.2251E+00	3.7936E-03	1.7325E-01	2.5263E-02	-3.7471E-01	5.8850E-04	-3.1224E-02	-3.9526E-03
8.506	1.6306E-02	3.3075E-01	1.2384E+00	3.3125E-03	1.6607E-01	2.4437E-02	-3.5584E-01	1.4161E-03	-2.7763E-02	-3.7384E-03
8.710	1.5298E-02	2.8042E-01	1.1429E+00	2.5089E-03	1.5796E-01	2.3266E-02	-3.4313E-01	1.0830E-03	-2.3340E-02	-3.1386E-03
8.913	1.1859E-02	1.0499E-01	1.0630E+00	1.2685E-03	1.4854E-01	1.9991E-02	-3.3494E-01	1.0635E-02	-1.3924E-02	-2.9175E-03

TEST 1100

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    5.3820
BEAM AT MIDSHIP=    3.5900

DISPLACED VOLUME/(L/2)**3=    .281541E+00
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .128380E+01
VERTICAL CENTER OF BOYANCY/L=  -.359100E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .549132E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .174398E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .215419E+01
PITCH-PITCH RESTORING COEFFICIENT=    .163230E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .851000E+00
TOTAL MASS=      .0048
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .149000E+00
(YAW-RADIUS OF GYRATION/L)**2=    .149000E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(NE)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.187	2.7117E-01	4.4902E-01	4.6671E+00	8.4923E-02	4.4649E-01	2.1125E-02	5.8862E-01	2.8051E-02	-1.0495E-01	-2.0422E-04
1.370	2.5269E-01	4.3029E-01	4.2635E+00	8.1518E-02	4.0785E-01	2.0298E-02	5.3657E-01	2.4966E-02	-9.7247E-02	5.4346E-04
1.553	2.4119E-01	3.9215E-01	3.9850E+00	7.6179E-02	3.8082E-01	1.5618E-02	4.9761E-01	2.0246E-02	-8.4146E-02	1.3650E-03
1.736	2.3473E-01	3.4408E-01	3.8035E+00	7.0156E-02	3.6162E-01	1.6510E-02	4.6799E-01	1.5207E-02	-6.8808E-02	1.9912E-03
1.919	2.3194E-01	2.3509E-01	3.6982E+00	6.4453E-02	3.4872E-01	1.4362E-02	4.4570E-01	1.0792E-02	-5.3987E-02	2.3084E-03
2.103	2.3179E-01	2.5044E-01	3.6409E+00	5.9734E-02	3.4043E-01	1.2394E-02	4.2801E-01	7.3424E-03	-4.1158E-02	2.3454E-03
2.286	2.3351E-01	2.1209E-01	3.6231E+00	5.6015E-02	3.3564E-01	1.0687E-02	4.1508E-01	4.8271E-03	-3.0753E-02	2.1856E-03
2.469	2.3669E-01	1.8016E-01	3.6549E+00	5.3257E-02	3.3488E-01	9.2484E-03	4.0052E-01	3.0821E-03	-2.2640E-02	1.9098E-03
2.652	2.4975E-01	1.5466E-01	3.7663E+00	5.1487E-02	3.3519E-01	8.0932E-03	3.7611E-01	2.0939E-03	-1.6800E-02	1.5040E-03
2.835	2.5980E-01	1.3922E-01	3.8937E+00	5.1589E-02	3.4339E-01	7.3529E-03	3.5918E-01	2.5418E-03	-1.4117E-02	7.8705E-04
3.019	2.6762E-01	1.2778E-01	4.0259E+00	5.2677E-02	3.4780E-01	6.7078E-03	3.5368E-01	2.8928E-03	-1.3036E-02	2.3621E-04
3.202	2.7420E-01	1.1833E-01	4.1980E+00	5.3950E-02	3.5307E-01	6.1540E-03	3.6286E-01	3.1005E-03	-1.2535E-02	-1.3122E-04
3.385	2.7929E-01	1.1023E-01	4.3488E+00	5.5102E-02	3.5923E-01	5.6745E-03	3.7850E-01	3.2277E-03	-1.2259E-02	-3.8055E-04
3.568	2.8297E-01	1.0306E-01	4.4597E+00	5.5886E-02	3.6459E-01	5.2480E-03	3.9348E-01	3.3327E-03	-1.1989E-02	-5.7944E-04
3.751	2.8579E-01	9.6814E-02	4.5608E+00	5.6593E-02	3.7064E-01	4.8785E-03	4.1225E-01	3.3805E-03	-1.1875E-02	-7.0018E-04
3.934	2.9394E-01	9.1473E-02	4.6549E+00	5.7313E-02	3.7834E-01	4.5767E-03	4.3166E-01	3.4405E-03	-1.1865E-02	-7.8213E-04
4.118	3.0091E-01	8.6659E-02	4.7554E+00	5.7894E-02	3.8621E-01	4.3098E-03	4.5096E-01	3.4847E-03	-1.1901E-02	-8.1658E-04
4.301	3.0436E-01	8.2379E-02	4.8538E+00	5.8225E-02	3.9371E-01	4.0682E-03	4.6236E-01	3.5077E-03	-1.1893E-02	-8.4049E-04
4.484	3.0708E-01	7.9810E-02	4.9259E+00	5.8631E-02	4.0007E-01	3.9403E-03	4.7308E-01	3.8635E-03	-1.2132E-02	-8.9715E-04
4.667	3.0849E-01	7.8767E-02	4.9748E+00	5.9061E-02	4.0508E-01	3.8807E-03	4.8229E-01	4.3239E-03	-1.2564E-02	-9.7140E-04
4.850	3.1172E-01	7.7645E-02	5.0319E+00	5.9352E-02	4.1481E-01	3.8170E-03	4.9982E-01	4.7083E-03	-1.2924E-02	-1.0190E-03
5.034	3.1446E-01	7.6473E-02	5.0747E+00	5.9469E-02	4.2316E-01	3.7514E-03	5.1289E-01	5.0275E-03	-1.3201E-02	-1.0566E-03
5.217	3.1581E-01	7.5269E-02	5.1070E+00	5.9445E-02	4.2958E-01	3.6849E-03	5.2442E-01	5.2919E-03	-1.3409E-02	-1.0857E-03
5.400	3.1679E-01	7.6337E-02	5.1263E+00	5.9628E-02	4.3485E-01	3.6305E-03	5.3377E-01	5.6486E-03	-1.3933E-02	-1.1304E-03
5.583	[illegible]729E-01	7.7104E-02	5.1345E+00	5.9682E-02	4.3913E-01	3.5749E-03	5.4157E-01	5.9484E-03	-1.4362E-02	-1.1662E-03
5.766	3.1764E-01	7.7624E-02	5.1344E+00	5.9478E-02	4.4269E-01	3.5196E-03	5.4794E-01	6.1980E-03	-1.4723E-02	-1.1878E-03
5.949	3.1721E-01	7.7934E-02	5.1302E+00	5.9199E-02	4.4353E-01	3.4641E-03	5.4783E-01	6.4063E-03	-1.5013E-02	-1.2043E-03
6.133	3.1671E-01	7.8232E-02	5.1231E+00	5.8932E-02	4.4392E-01	3.4119E-03	5.4696E-01	6.5561E-03	-1.5294E-02	-1.2094E-03
6.316	3.1600E-01	7.8364E-02	5.1052E+00	5.8614E-02	4.4405E-01	3.3599E-03	5.4548E-01	6.6782E-03	-1.5517E-02	-1.2117E-03
6.499	3.1528E-01	7.8974E-02	5.0890E+00	5.8309E-02	4.4422E-01	3.3666E-03	5.4303E-01	6.9663E-03	-1.5760E-02	-1.2328E-03
6.682	3.1513E-01	7.9399E-02	5.0706E+00	5.7980E-02	4.4448E-01	3.3674E-03	5.4041E-01	7.2133E-03	-1.5952E-02	-1.2499E-03
6.865	3.1457E-01	7.9667E-02	5.0490E+00	5.7647E-02	4.4486E-01	3.3633E-03	5.3863E-01	7.4245E-03	-1.6102E-02	-1.2638E-03
7.049	3.1370E-01	7.9800E-02	5.0264E+00	5.7345E-02	4.4584E-01	3.3549E-03	5.3839E-01	7.6048E-03	-1.6213E-02	-1.2758E-03
7.232	3.1233E-01	7.9805E-02	4.9875E+00	5.7203E-02	4.4054E-01	3.3386E-03	5.2716E-01	7.7648E-03	-1.6279E-02	-1.2921E-03
7.415	3.0903E-01	7.9657E-02	4.8203E+00	5.3193E-02	3.9106E-01	3.3005E-03	4.4179E-01	7.9325E-03	-1.6478E-02	-1.2114E-03
7.598	3.0687E-01	7.9559E-02	4.7523E+00	5.5869E-02	3.7731E-01	3.3076E-03	4.1619E-01	7.9985E-03	-1.6419E-02	-1.2673E-03
7.781	3.0827E-01	7.9370E-02	4.9610E+00	5.6327E-02	4.6042E-01	3.2919E-03	5.5662E-01	8.0807E-03	-1.6417E-02	-1.2752E-03
7.965	3.0847E-01	7.9152E-02	5.0900E+00	6.0011E-02	5.1631E-01	3.3141E-03	6.5038E-01	8.0795E-03	-1.6349E-02	-1.3105E-03
8.148	3.0292E-01	7.8642E-02	4.7989E+00	5.4912E-02	4.2465E-01	3.2375E-03	4.9522E-01	8.2282E-03	-1.6406E-02	-1.2601E-03
8.331	3.0514E-01	8.0694E-02	5.1453E+00	7.5843E-02	5.5718E-01	3.3172E-03	7.1702E-01	8.6135E-03	-1.6440E-02	-1.4482E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(NC)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.187	2.7760E-01	1.6161E-01	5.7012E+00	1.9699E-02	5.4059E-01	7.3329E-03	7.3621E-01	1.5474E-02	-4.9766E-02	-1.8359E-03
1.370	2.7067E-01	2.6484E-01	5.6849E+00	1.0673E-02	5.4633E-01	1.1992E-02	7.2831E-01	2.4282E-02	-7.9179E-02	-2.4610E-03
1.553	2.5796E-01	3.7270E-01	5.5569E+00	4.1086E-02	5.4207E-01	1.6861E-02	7.3989E-01	3.2101E-02	-1.0811E-01	-2.5081E-03
1.736	2.4105E-01	4.6832E-01	5.3422E+00	4.9112E-02	5.3064E-01	2.1214E-02	7.4267E-01	3.7382E-02	-1.3162E-01	-1.8675E-03
1.919	2.2136E-01	5.4367E-01	5.0622E+00	5.4087E-02	5.1337E-01	2.4723E-02	7.3784E-01	3.9915E-02	-1.4774E-01	-7.2346E-04
2.103	2.0067E-01	5.9830E-01	4.7760E+00	5.6240E-02	4.9167E-01	2.7364E-02	7.2637E-01	4.0254E-02	-1.5682E-01	6.5656E-04
2.286	1.7817E-01	6.3519E-01	4.7802E+00	5.6173E-02	4.6672E-01	2.9266E-02	7.0901E-01	3.9084E-02	-1.6017E-01	2.0642E-03
2.469	1.5642E-01	6.5796E-01	4.0151E+00	5.4524E-02	4.3997E-01	3.0573E-02	6.8511E-01	3.6955E-02	-1.5921E-01	3.3785E-03
2.652	1.3977E-01	6.6671E-01	3.6647E+00	5.1805E-02	4.1291E-01	3.1204E-02	6.5276E-01	3.3447E-02	-1.5490E-01	4.6098E-03
2.835	1.2216E-01	6.5092E-01	3.3735E+00	4.8554E-02	3.8549E-01	3.0866E-02	6.1537E-01	2.6650E-02	-1.4769E-01	5.7651E-03
3.019	1.0669E-01	6.2551E-01	3.0220E+00	4.5202E-02	3.5811E-01	3.0466E-02	5.7576E-01	2.1199E-02	-1.3932E-01	6.5301E-03
3.202	9.2549E-02	5.9854E-01	2.7427E+00	4.1837E-02	3.3134E-01	2.9954E-02	5.3659E-01	1.7144E-02	-1.3081E-01	6.9592E-03
3.385	7.9632E-02	5.7245E-01	2.4829E+00	3.8586E-02	3.0550E-01	2.9358E-02	4.9832E-01	1.4014E-02	-1.2259E-01	7.1667E-03
3.568	6.7730E-02	5.4868E-01	2.2246E+00	3.5458E-02	2.8049E-01	2.8781E-02	4.6046E-01	1.1285E-02	-1.1486E-01	7.2420E-03
3.751	6.0354E-02	5.2569E-01	2.2769E+00	3.2527E-02	2.5685E-01	2.8132E-02	4.2239E-01	9.1964E-03	-1.0753E-01	7.1987E-03
3.934	5.2014E-02	5.0384E-01	1.9061E+00	2.9639E-02	2.3712E-01	2.7375E-02	3.9503E-01	7.4185E-03	-1.0062E-01	7.0916E-03
4.118	4.5457E-02	4.8314E-01	1.7474E+00	2.7367E-02	2.1793E-01	2.6586E-02	3.6579E-01	6.0480E-03	-9.4196E-02	6.9322E-03
4.301	4.1335E-02	4.6414E-01	1.5995E+00	2.5042E-02	1.9962E-01	2.5851E-02	3.3791E-01	4.8223E-03	-8.8222E-02	6.7391E-03
4.484	3.6179E-02	4.4480E-01	1.4290E+00	2.2973E-02	1.7585E-01	2.5001E-02	2.9680E-01	3.4702E-03	-8.2687E-02	6.5515E-03
4.667	3.1409E-02	4.2251E-01	1.2705E+00	2.1043E-02	1.5352E-01	2.4019E-02	2.5815E-01	1.7311E-03	-7.7185E-02	6.3729E-03
4.850	2.5487E-02	4.0165E-01	1.1310E+00	1.9312E-02	1.3632E-01	2.3050E-02	2.3577E-01	2.4393E-04	-7.2100E-02	6.2060E-03
5.034	2.9017E-02	3.8230E-01	1.0496E+00	1.7686E-02	1.2475E-01	2.2149E-02	1.9956E-01	-1.1290E-03	-6.7357E-02	6.0360E-03
5.217	2.3967E-02	3.6429E-01	9.2955E-01	1.6157E-02	1.0947E-01	2.1308E-02	1.7950E-01	-2.3990E-03	-6.2921E-02	5.8631E-03
5.400	2.0812E-02	3.4432E-01	8.2525E-01	1.4791E-02	9.5813E-02	2.0513E-02	1.5759E-01	-3.6886E-03	-5.8671E-02	5.6830E-03
5.583	1.7875E-02	3.2564E-01	7.2664E-01	1.3501E-02	8.2834E-02	1.9766E-02	1.3782E-01	-4.8869E-03	-5.4673E-02	5.5000E-03
5.766	1.1944E-02	3.0802E-01	6.6536E-01	1.2377E-02	6.7826E-02	1.9031E-02	1.2745E-01	-5.9429E-03	-5.1047E-02	5.3915E-03
5.949	1.5563E-02	2.9149E-01	5.6788E-01	1.1316E-02	6.0355E-02	1.8340E-02	9.2286E-02	-6.9321E-03	-4.7634E-02	5.2841E-03
6.133	1.2796E-02	2.7559E-01	4.7700E-01	1.0379E-02	4.8136E-02	1.7683E-02	7.5853E-02	-7.8106E-03	-4.4411E-02	5.1768E-03
6.316	1.0552E-02	2.6061E-01	3.9538E-01	9.4882E-03	3.6860E-02	1.7062E-02	5.9028E-02	-8.6367E-03	-4.1365E-02	5.0694E-03
6.499	7.8172E-03	2.4761E-01	3.1205E-01	8.6669E-03	2.5397E-02	1.6584E-02	4.5069E-02	-9.0648E-03	-3.8636E-02	4.9125E-03
6.682	6.5954E-03	2.3532E-01	2.4933E-01	7.8800E-03	1.5989E-02	1.6131E-02	2.6594E-02	-9.4685E-03	-3.6043E-02	4.7556E-03
6.865	5.2567E-03	2.2769E-01	1.8944E-01	7.1206E-03	6.9051E-03	1.5703E-02	8.8051E-03	-9.8509E-03	-3.3567E-02	4.5952E-03
7.049	4.0618E-03	2.1266E-01	1.3185E-01	6.3770E-03	-1.5935E-03	1.5298E-02	-8.5443E-03	-1.0216E-02	-3.1186E-02	4.4222E-03
7.232	3.3069E-03	2.0209E-01	1.0529E-01	5.6584E-03	-4.6306E-04	1.4876E-02	-8.0359E-03	-1.0498E-02	-2.8789E-02	4.1780E-03
7.415	-2.7304E-03	1.9176E-01	-3.1513E-01	3.3056E-03	-1.3745E-01	1.4376E-02	-2.4146E-01	-1.0600E-02	-2.8243E-02	4.9718E-03
7.598	1.1653E-03	1.8272E-01	1.2336E-03	4.5201E-03	-1.6810E-02	1.4181E-02	-3.9518E-02	-1.1170E-02	-2.5187E-02	4.2248E-03
7.781	7.0031E-04	1.7384E-01	-7.8251E-03	3.7459E-03	-1.0640E-02	1.3960E-02	-3.0888E-02	-1.1555E-02	-2.3058E-02	3.9764E-03
7.965	-9.1270E-04	1.6719E-01	-1.0289E-01	4.5709E-03	-3.5032E-02	1.4270E-02	-7.3811E-02	-1.2998E-02	-1.9999E-02	3.1318E-03
8.148	-5.8620E-03	1.5653E-01	-4.4772E-01	2.4741E-03	-1.5050E-01	1.3114E-02	-2.7017E-01	-1.1827E-02	-1.9473E-02	3.7431E-03
9.331	-3.0823E-03	1.8467E-01	-1.3401E-01	-2.1748E-02	1.2576E-02	1.5169E-02	-2.2949E-02	-3.4758E-03	-1.6134E-02	-5.8159E-04

TEST 1300

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=     5.3440
BEAM AT MIDSHIP=     3.6000

DISPLACED VOLUME/(L/2)**3=    .282363E+00
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .126893E+01
VERTICAL CENTER OF BOYANCY/L=  -.359359E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .559059E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .175034E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .218966E+01
PITCH-PITCH RESTORING COEFFICIENT=    .164511E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .800000E+00
TOTAL MASS=      .0047
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .158000E+00
(YAW-RADIUS OF GYRATION/L)**2=    .158000E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.183	2.7550E-01	4.4683E-01	4.7232E+00	9.7101E-02	4.5355E-01	2.0817E-02	6.0310E-01	2.7952E-02	-1.0582E-01	-2.0828E-04
1.365	2.5668E-01	4.2834E-01	4.7118E+00	8.3633E-02	4.1430E-01	2.0007E-02	5.4981E-01	2.4913E-02	-9.8104E-02	5.3978E-04
1.548	2.4496E-01	3.9056E-01	4.0338E+00	7.8179E-02	3.8661E-01	1.8359E-02	5.0995E-01	2.0245E-02	-8.4942E-02	1.3645E-03
1.731	2.3835E-01	3.4286E-01	3.8538E+00	7.2015E-02	3.6727E-01	1.6266E-02	4.7967E-01	1.5248E-02	-6.9513E-02	1.9962E-03
1.913	2.3547E-01	2.9419E-01	3.7387E+00	6.6212E-02	3.5410E-01	1.4173E-02	4.5649E-01	1.0858E-02	-5.4587E-02	2.3196E-03
2.096	2.3529E-01	2.4980E-01	3.6799E+00	6.1326E-02	3.4581E-01	1.2235E-02	4.3882E-01	7.4181E-03	-4.1653E-02	2.3621E-03
2.279	2.37[illegible]E-01	2.1163E-01	3.6612E+00	5.7561E-02	3.4066E-01	1.0554E-02	4.2561E-01	4.9025E-03	-3.1154E-02	2.2065E-03
2.461	2.4935E-01	1.7984E-01	3.7137E+00	5.4658E-02	3.4171E-01	9.1357E-03	4.0447E-01	3.1508E-03	-2.2968E-02	1.9334E-03
2.644	2.5882E-01	1.5801E-01	3.8165E+00	5.3393E-02	3.4509E-01	8.3333E-03	3.8249E-01	3.2491E-03	-1.7841E-02	1.2875E-03
2.827	2.6612E-01	1.4441E-01	3.9379E+00	5.3668E-02	3.4857E-01	7.7695E-03	3.6747E-01	4.2194E-03	-1.5357E-02	4.9862E-04
3.010	2.7162E-01	1.3433E-01	4.0510E+00	5.4909E-02	3.5196E-01	7.2582E-03	3.6044E-01	4.9544E-03	-1.4428E-02	-1.0388E-04
3.192	2.7641E-01	1.2591E-01	4.2093E+00	5.6305E-02	3.5686E-01	6.8058E-03	3.6889E-01	5.4515E-03	-1.4038E-02	-5.0916E-04
3.375	2.8007E-01	1.1837E-01	4.3480E+00	5.7270E-02	3.6150E-01	6.3917E-03	3.6086E-01	5.8429E-03	-1.3659E-02	-8.3067E-04
3.558	2.8278E-01	1.1179E-01	4.4648E+00	5.8157E-02	3.6658E-01	6.0246E-03	3.9673E-01	6.1034E-03	-1.3466E-02	-1.0446E-03
3.740	2.8478E-01	1.0559E-01	4.5652E+00	5.8545E-02	3.7244E-01	5.6594E-03	4.1635E-01	6.2663E-03	-1.3390E-02	-1.1756E-03
3.923	2.9230E-01	1.0094E-01	4.6585E+00	5.9729E-02	3.8007E-01	5.4265E-03	4.3668E-01	6.4142E-03	-1.3436E-02	-1.2646E-03
4.106	2.9773E-01	9.6373E-02	4.7456E+00	6.0357E-02	3.8788E-01	5.1835E-03	4.5660E-01	6.5065E-03	-1.3497E-02	-1.3035E-03
4.288	3.0357E-01	9.2192E-02	4.8382E+00	6.0719E-02	3.9580E-01	4.9570E-03	4.6731E-01	6.5653E-03	-1.3503E-02	-1.3295E-03
4.471	3.0880E-01	8.9688E-02	4.9319E+00	6.1066E-02	4.0754E-01	4.8355E-03	4.8767E-01	6.9397E-03	-1.3707E-02	-1.4060E-03
4.654	3.1280E-01	8.8042E-02	5.0032E+00	6.1431E-02	4.1721E-01	4.7162E-03	5.0475E-01	7.2085E-03	-1.4029E-02	-1.4419E-03
4.836	3.1550E-01	8.6381E-02	5.0469E+00	6.1604E-02	4.2508E-01	4.5996E-03	5.1947E-01	7.4196E-03	-1.4268E-02	-1.4670E-03
5.019	3.1900E-01	8.4727E-02	5.0973E+00	6.1675E-02	4.3580E-01	4.4878E-03	5.3813E-01	7.5800E-03	-1.4459E-02	-1.4724E-03
5.202	3.2036E-01	8.3367E-02	5.1446E+00	6.1608E-02	4.4425E-01	4.3796E-03	5.5440E-01	7.7010E-03	-1.4591E-02	-1.4728E-03
5.385	3.2150E-01	8.3711E-02	5.1770E+00	6.1755E-02	4.5126E-01	4.2866E-03	5.6782E-01	7.9209E-03	-1.5046E-02	-1.4913E-03
5.567	3.2214E-01	8.4075E-02	5.1965E+00	6.1775E-02	4.5702E-01	4.1958E-03	5.7911E-01	8.0964E-03	-1.5412E-02	-1.5034E-03
5.750	3.2245E-01	8.4226E-02	5.1914E+00	6.1481E-02	4.5748E-01	4.1081E-03	5.8035E-01	8.2333E-03	-1.5716E-02	-1.5036E-03
5.933	3.2202E-01	8.4198E-02	5.1900E+00	6.1120E-02	4.5767E-01	4.0230E-03	5.7968E-01	8.3384E-03	-1.5954E-02	-1.5008E-03
6.115	3.2153E-01	8.4181E-02	5.1823E+00	6.0778E-02	4.5749E-01	3.9436E-03	5.7822E-01	8.3940E-03	-1.6127E-02	-1.4882E-03
6.298	3.2083E-01	8.4025E-02	5.1695E+00	6.0392E-02	4.5709E-01	3.8665E-03	5.7619E-01	8.4293E-03	-1.6367E-02	-1.4744E-03
6.481	3.2092E-01	8.3751E-02	5.1567E+00	5.9976E-02	4.5693E-01	3.7916E-03	5.7271E-01	8.4476E-03	-1.6501E-02	-1.4597E-03
6.663	3.2059E-01	8.3381E-02	5.1430E+00	5.9545E-02	4.5691E-01	3.7189E-03	5.7063E-01	8.4513E-03	-1.6596E-02	-1.4445E-03
6.846	3.1987E-01	8.2930E-02	5.1256E+00	5.9120E-02	4.5705E-01	3.6484E-03	5.6931E-01	8.4428E-03	-1.6656E-02	-1.4293E-03
7.029	3.1863E-01	8.2412E-02	5.1016E+00	5.8735E-02	4.5762E-01	3.5799E-03	5.6948E-01	8.4240E-03	-1.6686E-02	-1.4150E-03
7.211	3.1730E-01	8.1824E-02	5.0658E+00	5.8540E-02	4.5190E-01	3.5082E-03	5.5792E-01	8.4453E-03	-1.6677E-02	-1.4084E-03
7.394	3.1366E-01	8.1150E-02	4.8530E+00	5.4430E-02	3.9761E-01	3.4239E-03	4.6527E-01	8.4037E-03	-1.6812E-02	-1.3039E-03
7.577	3.1147E-01	8.0560E-02	4.8350E+00	5.7041E-02	3.8592E-01	3.3841E-03	4.4474E-01	8.3243E-03	-1.6692E-02	-1.3403E-03
7.759	3.1274E-01	7.9888E-02	5.0420E+00	5.7424E-02	4.6776E-01	3.3277E-03	5.8223E-01	8.2707E-03	-1.6634E-02	-1.3303E-03
7.942	3.1282E-01	7.9303E-02	5.1710E+00	6.1623E-02	5.2218E-01	3.3118E-03	6.7369E-01	8.1476E-03	-1.6502E-02	-1.3565E-03
8.125	3.0635E-01	7.9430E-02	4.8221E+00	5.5703E-02	4.2189E-01	3.2027E-03	4.9510E-01	8.1809E-03	-1.6529E-02	-1.2818E-03
8.308	3.0965E-01	[illegible]	5.1355E+00	7.3889E-02	5.5327E-01	3.2470E-03	7.0541E-01	8.4307E-03	-1.6571E-02	-1.4098E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.183	2.8134E-01	1.5979E-01	5.7454E+00	2.0085E-02	5.4701E-01	7.1816E-03	7.2100E-01	1.5278E-02	-4.9878E-02	-1.8355E-03
1.365	2.7442E-01	2.6204E-01	5.7308E+00	3.1300E-02	5.5284E-01	1.1752E-02	7.4357E-01	2.4004E-02	-7.9358E-02	-2.4661E-03
1.548	2.6163E-01	3.6659E-01	5.6041E+00	4.1962E-02	5.4912E-01	1.6533E-02	7.5542E-01	3.1776E-02	-1.0840E-01	-2.5221E-03
1.731	2.4458E-01	4.6392E-01	5.3900E+00	5.0205E-02	5.3786E-01	2.0811E-02	7.5832E-01	3.7057E-02	-1.3216E-01	-1.8911E-03
1.913	2.2471E-01	5.3885E-01	5.1101E+00	5.5343E-02	5.2071E-01	2.4261E-02	7.5390E-01	3.9627E-02	-1.4843E-01	-7.5403E-04
2.096	2.0320E-01	5.9327E-01	4.7836E+00	5.7600E-02	4.9968E-01	2.6866E-02	7.4192E-01	4.0021E-02	-1.5763E-01	6.2311E-04
2.279	1.8106E-01	6.3011E-01	4.4272E+00	5.7586E-02	4.7417E-01	2.8742E-02	7.2445E-01	3.8914E-02	-1.6107E-01	2.0320E-03
2.461	1.6231E-01	6.5294E-01	4.0674E+00	5.5948E-02	4.4800E-01	3.0033E-02	6.9842E-01	3.6849E-02	-1.6019E-01	3.3511E-03
2.644	1.4443E-01	6.5675E-01	3.7162E+00	5.3261E-02	4.2111E-01	3.0183E-02	6.6515E-01	3.1849E-02	-1.5568E-01	4.6637E-03
2.827	1.2760E-01	6.4018E-01	3.3877E+00	4.9993E-02	3.9379E-01	2.9772E-02	6.2609E-01	2.4856E-02	-1.4849E-01	5.8246E-03
3.010	1.1191E-01	6.1436E-01	3.0761E+00	4.6607E-02	3.6642E-01	2.9309E-02	5.8560E-01	1.9247E-02	-1.4011E-01	6.5929E-03
3.192	9.7575E-02	5.8651E-01	2.7970E+00	4.3198E-02	3.3959E-01	2.8742E-02	5.4508E-01	1.5048E-02	-1.3157E-01	7.0237E-03
3.375	8.4558E-02	5.6146E-01	2.5444E+00	3.9864E-02	3.1344E-01	2.8190E-02	5.0482E-01	1.1412E-02	-1.2348E-01	7.2695E-03
3.558	7.2845E-02	5.3716E-01	2.3169E+00	3.6668E-02	2.8856E-01	2.7565E-02	4.6649E-01	8.5885E-03	-1.1572E-01	7.3446E-03
3.740	6.2343E-02	5.1390E-01	2.1096E+00	3.3769E-02	2.6501E-01	2.6876E-02	4.3100E-01	6.4066E-03	-1.0837E-01	7.3010E-03
3.923	5.6276E-02	4.9151E-01	1.9461E+00	3.0977E-02	2.4591E-01	2.6090E-02	4.0361E-01	4.5527E-03	-1.0143E-01	7.1931E-03
4.106	5.0685E-02	4.7050E-01	1.7927E+00	2.8461E-02	2.2713E-01	2.5277E-02	3.7547E-01	3.1047E-03	-9.4984E-02	7.0330E-03
4.288	4.2776E-02	4.5123E-01	1.6361E+00	2.6093E-02	2.0791E-01	2.4522E-02	3.5268E-01	1.8061E-03	-8.8992E-02	6.8404E-03
4.471	4.0158E-02	4.3194E-01	1.6514E+00	2.3918E-02	2.2842E-01	2.3714E-02	4.1403E-01	2.4772E-04	-8.3373E-02	6.6260E-03
4.654	3.7956E-02	4.1159E-01	1.7412E+00	2.1910E-02	2.4690E-01	2.2904E-02	4.6968E-01	-9.5246E-04	-7.8005E-02	6.4299E-03
4.836	3.4150E-02	3.9275E-01	1.7760E+00	2.0020E-02	2.6267E-01	2.2148E-02	5.2352E-01	-2.0480E-03	-7.2991E-02	6.2214E-03
5.019	4.0136E-02	3.7505E-01	1.8786E+00	1.8347E-02	2.8695E-01	2.1391E-02	5.6850E-01	-2.9505E-03	-6.8343E-02	6.0266E-03
5.202	3.7292E-02	3.5659E-01	1.9316E+00	1.6774E-02	3.0500E-01	2.0684E-02	6.2387E-01	-3.7840E-03	-6.3996E-02	5.8312E-03
5.385	3.6183E-02	3.4329E-01	1.9884E+00	1.5370E-02	3.2238E-01	2.0015E-02	6.7269E-01	-4.6549E-03	-5.9844E-02	5.6302E-03
5.567	3.5150E-02	3.2318E-01	2.0433E+00	1.4044E-02	3.3639E-01	1.9387E-02	7.1823E-01	-5.4627E-03	-5.5940E-02	5.4284E-03
5.750	3.0664E-02	3.0764E-01	2.0953E+00	1.2869E-02	3.4969E-01	1.8763E-02	7.6898E-01	-6.1534E-03	-5.2407E-02	5.3058E-03
5.933	3.6321E-02	2.9190E-01	2.1531E+00	1.1759E-02	3.6797E-01	1.8176E-02	7.9099E-01	-6.8001E-03	-4.9083E-02	5.1855E-03
6.115	3.5147E-02	2.7730E-01	2.1871E+00	1.0778E-02	3.7979E-01	1.7617E-02	8.2890E-01	-7.3561E-03	-4.5943E-02	5.0661E-03
6.298	3.4393E-02	2.6354E-01	2.2228E+00	9.8453E-03	3.9117E-01	1.7089E-02	8.6332E-01	-7.8786E-03	-4.2975E-02	4.9479E-03
6.481	3.4319E-02	2.5056E-01	2.2667E+00	8.9557E-03	4.0254E-01	1.6590E-02	8.9264E-01	-8.3706E-03	-4.0164E-02	4.8298E-03
6.663	3.4195E-02	2.3829E-01	2.3037E+00	8.1032E-03	4.1294E-01	1.6119E-02	9.1913E-01	-8.8350E-03	-3.7494E-02	4.7105E-03
6.846	3.4070E-02	2.2668E-01	2.3382E+00	7.2799E-03	4.2258E-01	1.5672E-02	9.4386E-01	-9.2748E-03	-3.4948E-02	4.5869E-03
7.029	3.3938E-02	2.1567E-01	2.3699E+00	6.4723E-03	4.3138E-01	1.5251E-02	9.6673E-01	-9.6944E-03	-3.2504E-02	4.4519E-03
7.211	3.4282E-02	2.0512E-01	2.4343E+00	5.6869E-03	4.5195E-01	1.4815E-02	1.0091E+00	-1.0033E-02	-3.0065E-02	4.2525E-03
7.394	2.9136E-02	1.9491E-01	2.0944E+00	3.4524E-03	3.3023E-01	1.4336E-02	8.1141E-01	-1.0246E-02	-2.9183E-02	4.9154E-03
7.577	3.3927E-02	1.6579E-01	2.4812E+00	4.4368E-03	4.6457E-01	1.4091E-02	1.0448E+00	-1.0803E-02	-2.6271E-02	4.3169E-03
7.759	3.4279E-02	1.7691E-01	2.5402E+00	3.5677E-03	4.8793E-01	1.3789E-02	1.0858E+00	-1.1228E-02	-2.4115E-02	4.1135E-03
7.942	3.3231E-02	1.7062E-01	2.4963E+00	4.6458E-03	4.7137E-01	1.4062E-02	1.0682E+00	-1.2561E-02	-2.1018E-02	3.3022E-03
8.125	1.2897E-03	1.5969E-01	6.4505E-02	1.9633E-03	-5.2759E-02	1.3000E-02	-4.6970E-02	-1.1615E-02	-2.0475E-02	3.9606E-03
8.308	-4.6298E-03	1.8676E-01	-2.6006E-01	-1.1132E-02	-1.8725E-02	1.4673E-02	-8.9842E-02	-2.7375E-03	-1.8169E-02	3.1171E-04

TEST 1500

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=     6.4970
BEAM AT MIDSHIP=     3.4700

DISPLACED VOLUME/(L/2)**3=    .202231E+00
LONGITUDINAL CENTER OF BUOYANCY/(L/2)=    .110593E+01
VERTICAL CENTER OF BUOYANCY/L=   -.259911E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .432063E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .200435E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .779471E+00
PITCH-PITCH RESTORING COEFFICIENT=    .159534E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .636000E+00
TOTAL MASS=      .0359
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .147000E+00
(YAW-RADIUS OF GYRATION/L)**2=    .147000E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFP= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(RAD)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.304	3.2399E-02	4.1119E-01	4.4041E+00	5.5138E-02	3.5474E-01	2.7932E-02	1.6237E-01	5.4380E-03	-8.6470E-02	-9.6527E-04
1.517	2.9505E-02	4.0025E-01	4.0024E+00	5.2720E-02	3.2234E-01	2.7251E-02	1.4712E-01	6.4000E-03	-8.0878E-02	-6.9865E-04
1.729	2.7531E-02	3.7062E-01	3.7356E+00	4.8847E-02	3.0095E-01	2.5345E-02	1.3580E-01	6.7811E-03	-7.6215E-02	-3.8439E-04
1.942	2.6217E-02	3.2952E-01	3.5660E+00	4.4507E-02	2.8642E-01	2.2664E-02	1.2729E-01	5.6521E-03	-5.7135E-02	-1.2923E-04
2.154	2.5396E-02	2.8520E-01	3.4688E+00	4.0533E-02	2.7796E-01	1.9747E-02	1.2489E-01	3.5604E-03	-4.4184E-02	1.7404E-05
2.367	2.4928E-02	2.4323E-01	3.4259E+00	3.7328E-02	2.7377E-01	1.6959E-02	1.1619E-01	2.4303E-03	-3.2848E-02	6.2851E-05
2.579	2.4742E-02	2.0613E-01	3.4236E+00	3.4959E-02	2.7279E-01	1.4474E-02	1.1291E-01	1.6454E-03	-2.3633E-02	3.7346E-05
2.791	2.4704E-02	1.7455E-01	3.4508E+00	3.3326E-02	2.7418E-01	1.2340E-02	1.1084E-01	1.1400E-03	-1.6487E-02	-2.9212E-05
3.004	2.4941E-02	1.4819E-01	3.4987E+00	3.2279E-02	2.7727E-01	1.0542E-02	1.0984E-01	6.4960E-04	-1.1132E-02	-1.1473E-04
3.216	2.5205E-02	1.2658E-01	3.5963E+00	3.1805E-02	2.8159E-01	9.0464E-03	1.0866E-01	7.1169E-04	-7.3887E-03	-2.1178E-04
3.429	2.5606E-02	1.1293E-01	3.8653E+00	3.3528E-02	2.9253E-01	8.0574E-03	1.1497E-01	5.9187E-04	-6.9541E-03	-5.2064E-04
3.641	2.6556E-02	1.0219E-01	4.2724E+00	3.5060E-02	3.1818E-01	7.2545E-03	1.1197E-01	1.0700E-03	-6.9516E-03	-6.6324E-04
3.854	2.7825E-02	9.3214E-02	4.6064E+00	3.6290E-02	3.4012E-01	6.5922E-03	1.0602E-01	1.0743E-03	-7.1092E-03	-6.9518E-04
4.066	2.9016E-02	8.5656E-02	4.8941E+00	3.7260E-02	3.6358E-01	6.0553E-03	1.1851E-01	1.0048E-03	-7.3173E-03	-6.6231E-04
4.279	3.1015E-02	7.9095E-02	5.1033E+00	3.7876E-02	3.8119E-01	5.5879E-03	1.2881E-01	9.4730E-04	-7.4529E-03	-6.3896E-04
4.491	3.2109E-02	7.3358E-02	5.2532E+00	3.8223E-02	3.9426E-01	5.1785E-03	1.3737E-01	8.9847E-04	-7.5341E-03	-6.0671E-04
4.704	3.3438E-02	6.8337E-02	5.3649E+00	3.8459E-02	4.0574E-01	4.8249E-03	1.4840E-01	8.4187E-04	-7.6238E-03	-5.4642E-04
4.916	3.4423E-02	6.3890E-02	5.4380E+00	3.8511E-02	4.1381E-01	4.5117E-03	1.5706E-01	7.9149E-04	-7.6703E-03	-4.9906E-04
5.129	3.5133E-02	5.9931E-02	5.4808E+00	3.8423E-02	4.1918E-01	4.2328E-03	1.6380E-01	7.4640E-04	-7.6830E-03	-4.5752E-04
5.341	3.5624E-02	5.6387E-02	5.4998E+00	3.8227E-02	4.2239E-01	3.9831E-03	1.6900E-01	7.0583E-04	-7.6694E-03	-4.2087E-04
5.554	3.5938E-02	5.3199E-02	5.4999E+00	3.7948E-02	4.2390E-01	3.7586E-03	1.7293E-01	6.6917E-04	-7.6354E-03	-3.8839E-04
5.766	3.6105E-02	5.1857E-02	5.4850E+00	3.7925E-02	4.2405E-01	3.5615E-03	1.7564E-01	5.9600E-04	-7.9092E-03	-3.5141E-04
5.979	3.6167E-02	5.1046E-02	5.4583E+00	3.7954E-02	4.2310E-01	3.4334E-03	1.7790E-01	3.7597E-04	-8.2440E-03	-2.7990E-04
6.191	3.6131E-02	5.1377E-02	5.4223E+00	3.8148E-02	4.2128E-01	3.3523E-03	1.7927E-01	3.8404E-04	-8.7633E-03	-2.6015E-04
6.404	3.6026E-02	5.1552E-02	5.3789E+00	3.8233E-02	4.1877E-01	3.2742E-03	1.8007E-01	3.9023E-04	-9.1967E-03	-2.4236E-04
6.616	3.5849E-02	5.2334E-02	5.3299E+00	3.8397E-02	4.1570E-01	3.3028E-03	1.8040E-01	5.0845E-04	-9.7316E-03	-2.5723E-04
6.829	3.5629E-02	5.3395E-02	5.2764E+00	3.8570E-02	4.1220E-01	3.3800E-03	1.8034E-01	7.7677E-04	-1.0266E-02	-2.9872E-04
7.041	3.5370E-02	5.4234E-02	5.2196E+00	3.8652E-02	4.0836E-01	3.4419E-03	1.7996E-01	1.0123E-03	-1.0720E-02	-3.3482E-04
7.254	3.5079E-02	5.4885E-02	5.1603E+00	3.8659E-02	4.0426E-01	3.4910E-03	1.7931E-01	1.2192E-03	-1.1103E-02	-3.6623E-04
7.466	3.4764E-02	5.5375E-02	5.0992E+00	3.8603E-02	3.9995E-01	3.5249E-03	1.7845E-01	1.4013E-03	-1.1426E-02	-3.9357E-04
7.679	3.4430E-02	5.5727E-02	5.0369E+00	3.8493E-02	3.9556E-01	3.5573E-03	1.7740E-01	1.5617E-03	-1.1697E-02	-4.1737E-04
7.891	3.4081E-02	5.5962E-02	4.9738E+00	3.8339E-02	3.9093E-01	3.5776E-03	1.7621E-01	1.7030E-03	-1.1922E-02	-4.3807E-04
8.104	3.3720E-02	5.6096E-02	4.9103E+00	3.8148E-02	3.8630E-01	3.5910E-03	1.7490E-01	1.8275E-03	-1.2108E-02	-4.5606E-04
8.316	3.3351E-02	5.6143E-02	4.8467E+00	3.7926E-02	3.8162E-01	3.5982E-03	1.7348E-01	1.9372E-03	-1.2260E-02	-4.7165E-04
8.529	3.2977E-02	5.6116E-02	4.7833E+00	3.7679E-02	3.7693E-01	3.6004E-03	1.7200E-01	2.0339E-03	-1.2382E-02	-4.8515E-04
8.741	3.2602E-02	5.6025E-02	4.7328E+00	3.7410E-02	3.7247E-01	3.5981E-03	1.6919E-01	2.1190E-03	-1.2477E-02	-4.9679E-04
8.954	3.2231E-02	5.5880E-02	4.7020E+00	3.7125E-02	3.6959E-01	3.5919E-03	1.6152E-01	2.1938E-03	-1.2550E-02	-5.0679E-04
9.166	3.1906E-02	5.5607E-02	4.6727E+00	3.6825E-02	3.6678E-01	3.5824E-03	1.5371E-01	2.2595E-03	-1.2603E-02	-5.1535E-04
9.379	3.1554E-02	5.5455E-02	4.6507E+00	3.6514E-02	3.6445E-01	3.5701E-03	1.4442E-01	2.3170E-03	-1.2637E-02	-5.2261E-04
9.591	3.1211E-02	5.3701E-02	4.6370E+00	3.6272E-02	3.6196E-01	3.4951E-03	1.3547E-01	2.5400E-03	-1.2599E-02	-5.3667E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

RE(NO)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.304	4.2336E-02	1.4296E-01	5.5208E+00	1.4161E-02	4.7583E-01	9.4751E-03	2.0950E-01	5.3973E-03	-4.2527E-02	-8.5076E-04
1.517	4.2540E-02	2.4575E-01	5.8806E+00	2.2614E-02	4.7493E-01	1.6308E-02	2.1609E-01	8.6564E-03	-7.0433E-02	-1.2201E-03
1.729	4.1038E-02	3.5974E-01	5.7235E+00	3.0543E-02	4.6370E-01	2.3534E-02	2.1885E-01	1.1539E-02	-9.8968E-02	-1.3774E-03
1.942	4.0088E-02	4.6657E-01	5.4520E+00	3.6324E-02	4.4443E-01	3.1154E-02	2.1831E-01	1.2294E-02	-1.2279E-01	-1.2567E-03
2.154	3.8440E-02	5.5528E-01	5.1072E+00	3.9417E-02	4.1907E-01	3.7237E-02	2.1485E-01	1.4123E-02	-1.3936E-01	-9.2517E-04
2.367	3.6136E-02	6.2304E-01	4.7098E+00	4.0125E-02	3.6938E-01	4.1934E-02	2.0837E-01	1.3963E-02	-1.4870E-01	-4.9289E-04
2.579	3.3507E-02	6.7160E-01	4.2809E+00	3.9066E-02	3.5695E-01	4.5459E-02	2.0044E-01	1.3208E-02	-1.5202E-01	-4.6861E-05
2.791	3.0753E-02	7.0414E-01	3.8385E+00	3.6851E-02	3.2314E-01	4.7889E-02	1.9027E-01	1.2097E-02	-1.5080E-01	3.6354E-04
3.004	2.7934E-02	7.2382E-01	3.3972E+00	3.3960E-02	2.8935E-01	4.9451E-02	1.7885E-01	1.0790E-02	-1.4628E-01	7.1826E-04
3.216	2.5121E-02	7.3152E-01	2.9731E+00	3.0729E-02	2.5549E-01	5.0320E-02	1.6658E-01	9.3079E-03	-1.3931E-01	1.0233E-03
3.429	2.2382E-02	7.2836E-01	2.6164E+00	2.7754E-02	2.2459E-01	4.9310E-02	1.5666E-01	5.6792E-03	-1.2976E-01	1.2350E-03
3.641	1.9874E-02	6.8233E-01	2.3552E+00	2.5070E-02	2.0101E-01	4.8045E-02	1.4162E-01	3.7842E-03	-1.2871E-01	1.3989E-03
3.854	1.7745E-02	6.5652E-01	2.1333E+00	2.2645E-02	1.8030E-01	4.6502E-02	1.2470E-01	3.2023E-03	-1.1233E-01	1.3218E-03
4.066	1.5349E-02	6.3213E-01	1.9428E+00	2.0499E-02	1.6316E-01	4.4851E-02	1.1276E-01	3.2746E-03	-1.0467E-01	1.1803E-03
4.279	1.4281E-02	6.1011E-01	1.7704E+00	1.8548E-02	1.4752E-01	4.3352E-02	1.0161E-01	3.3598E-03	-9.7734E-02	1.0314E-03
4.491	1.2733E-02	5.9012E-01	1.6137E+00	1.6771E-02	1.3321E-01	4.1981E-02	9.1203E-02	3.4629E-03	-9.1411E-02	8.7659E-04
4.704	1.1814E-02	5.7145E-01	1.4790E+00	1.5218E-02	1.2219E-01	4.0612E-02	8.5707E-02	3.8002E-03	-8.5644E-02	7.2761E-04
4.916	1.0975E-02	5.5440E-01	1.3560E+00	1.3800E-02	1.1212E-01	3.9361E-02	8.0687E-02	4.1084E-03	-8.0375E-02	5.9152E-04
5.129	1.0205E-02	5.3876E-01	1.2432E+00	1.2500E-02	1.0289E-01	3.8214E-02	7.6082E-02	4.3910E-03	-7.5542E-02	4.6670E-04
5.341	9.4967E-03	5.2436E-01	1.1393E+00	1.1333E-02	9.4285E-02	3.7158E-02	7.1844E-02	4.6511E-03	-7.1094E-02	3.5181E-04
5.554	8.8423E-03	5.1107E-01	1.0434E+00	1.0198E-02	8.6535E-02	3.6183E-02	6.7930E-02	4.8914E-03	-6.6986E-02	2.4571E-04
5.766	8.2362E-03	4.9482E-01	9.5457E-01	9.2852E-03	7.9263E-02	3.5265E-02	6.4304E-02	5.1995E-03	-6.2917E-02	1.4524E-04
5.979	7.6732E-03	4.7857E-01	8.7206E-01	8.5269E-03	7.2509E-02	3.4272E-02	6.0936E-02	5.9209E-03	-5.9132E-02	5.1562E-05
6.191	7.1488E-03	4.5799E-01	7.9520E-01	7.8504E-03	6.6218E-02	3.3178E-02	5.7800E-02	5.7124E-03	-5.5325E-02	1.4216E-05
6.404	6.6592E-03	4.3897E-01	7.2345E-01	7.2188E-03	6.0344E-02	3.2196E-02	5.4871E-02	5.5177E-03	-5.1770E-02	-2.0852E-05
6.616	6.2010E-03	4.1546E-01	6.5630E-01	6.4811E-03	5.4848E-02	3.0439E-02	5.2131E-02	3.6108E-03	-4.7828E-02	1.3568E-04
6.829	5.7714E-03	3.9349E-01	5.9334E-01	5.9780E-03	4.9694E-02	2.8837E-02	4.9561E-02	1.6484E-03	-4.4398E-02	1.9014E-04
7.041	5.3677E-03	3.7285E-01	5.3417E-01	5.5053E-03	4.4851E-02	2.7332E-02	4.7146E-02	1.5234E-04	-4.1175E-02	2.4131E-04
7.254	4.9876E-03	3.5242E-01	4.7847E-01	5.0602E-03	4.0291E-02	2.5919E-02	4.4873E-02	-1.3667E-03	-3.8141E-02	2.8549E-04
7.466	4.6292E-03	3.3509E-01	4.2594E-01	4.6405E-03	3.5991E-02	2.4578E-02	4.2729E-02	-2.8369E-03	-3.5279E-02	3.3492E-04
7.679	4.2936E-03	3.1778E-01	3.7632E-01	4.2441E-03	3.1930E-02	2.3316E-02	4.0704E-02	-4.2258E-03	-3.2576E-02	3.7784E-04
7.891	3.9703E-03	3.0146E-01	3.2937E-01	3.8689E-03	2.9087E-02	2.2121E-02	3.8788E-02	-5.5460E-03	-3.0018E-02	4.1844E-04
8.104	3.6668E-03	2.8508E-01	2.8488E-01	3.5135E-03	2.4445E-02	2.0985E-02	3.6972E-02	-6.7851E-03	-2.7595E-02	4.5692E-04
8.316	3.3787E-03	2.7115E-01	2.4267E-01	3.1762E-03	2.0589E-02	1.9915E-02	3.5249E-02	-7.9667E-03	-2.5295E-02	4.9243E-04
8.529	3.1050E-03	2.5716E-01	2.0256E-01	2.8557E-03	1.7706E-02	1.8895E-02	3.3612E-02	-9.0894E-03	-2.3110E-02	5.2812E-04
8.741	2.8379E-03	2.4285E-01	1.5066E-01	2.5508E-03	1.4309E-02	1.7924E-02	3.3936E-02	-1.0197E-02	-2.1032E-02	5.6113E-04
8.954	2.6393E-03	2.3116E-01	1.9226E-01	2.2604E-03	1.7156E-02	1.6999E-02	1.3281E-02	-1.1175E-02	-1.9052E-02	5.9257E-04
9.166	2.4115E-03	2.1907E-01	1.7606E-01	1.9834E-03	1.4709E-02	1.6117E-02	1.0268E-02	-1.2145E-02	-1.7163E-02	6.2255E-04
9.379	2.1387E-03	2.0753E-01	6.2088E-02	1.7190E-03	5.6568E-03	1.5275E-02	2.9598E-02	-1.2071E-02	-1.5361E-02	6.5117E-04
9.591	2.0414E-03	1.8044E-01	2.4729E-01	1.0631E-02	1.5122E-02	1.4112E-02	-1.2598E-02	-1.2845E-02	-1.2700E-02	6.3598E-04

TEST 1700

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   10.6900
BEAM AT MIDSHIP=    3.9700

DISPLACED VOLUME/(L/2)**3=   .824530E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=   .126933E+01
VERTICAL CENTER OF BOYANCY/L=  -.190296E-01
METACENTER HEIGHT OVER WATE-PLANE/L=   .282228E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .315874E+02
HEAVE-PITCH RESTORING COEFFICIENT=   .336476E+01
PITCH-PITCH RESTORING COEFFICIENT=   .281351E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .796000E+00
TOTAL MASS=      .0109
(ROLL-RADIUS OF GYRATION/L)**2=   .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .989000E-01
(YAW-RADIUS OF GYRATION/L)**2=   .989000E-01
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL. SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.265	7.8109E-02	4.02[illegible]0E-01	5.3444E+00	2.3686E-02	4.7497E-01	2.1203E-02	5.4612E-01	2.4021E-02	-7.1169E-02	-1.9292E-03
1.474	7.0477E-02	4.0924E-01	4.7653E+00	2.3844E-02	4.2450E-01	2.1602E-02	4.5076E-01	2.3943E-02	-7.2201E-02	-1.6190E-03
1.683	6.5052E-02	4.0494E-01	4.3411E+00	2.3452E-02	3.8726E-01	2.1436E-02	4.4845E-01	2.2589E-02	-7.0813E-02	-1.5336E-03
1.893	6.1221E-02	3.8821E-01	4.0286E+00	2.2502E-02	3.5935E-01	2.0660E-02	4.1551E-01	2.0085E-02	-6.6989E-02	-1.1206E-03
2.102	5.8572E-02	3.6179E-01	3.7990E+00	2.1150E-02	3.3841E-01	1.9404E-02	3.8551E-01	1.6955E-02	-6.1127E-02	-6.7929E-04
2.312	5.6817E-02	3.3021E-01	3.6325E+00	1.9615E-02	3.2277E-01	1.7880E-02	3.6878E-01	1.3791E-02	-5.4432E-02	-3.0050E-04
2.521	5.5747E-02	2.9761E-01	3.5148E+00	1.8091E-02	3.1124E-01	1.6284E-02	3.5210E-01	1.0991E-02	-4.7682E-02	-2.9904E-05
2.730	5.5159E-02	2.6674E-01	3.4351E+00	1.6703E-02	3.0292E-01	1.4749E-02	3.3889E-01	8.7181E-03	-4.1427E-02	1.2931E-04
2.940	5.5048E-02	2.3896E-01	3.3851E+00	1.5505E-02	2.9714E-01	1.3345E-02	3.2836E-01	6.9748E-03	-3.5927E-02	1.5650E-04
3.149	5.5192E-02	2.1473E-01	3.3583E+00	1.4509E-02	2.9337E-01	1.2058E-02	3.2015E-01	5.6929E-03	-3.1246E-02	1.5678E-04
3.359	5.5662E-02	1.9397E-01	3.3909E+00	1.3701E-02	2.9345E-01	1.1018E-02	3.0432E-01	4.7857E-03	-2.7344E-02	1.5261E-04
3.568	5.7839E-02	1.7638E-01	3.4753E+00	1.3058E-02	2.9720E-01	1.0072E-02	2.8145E-01	4.1740E-03	-2.4132E-02	8.1280E-05
3.777	5.9779E-02	1.6245E-01	3.5987E+00	1.2736E-02	3.0050E-01	9.3417E-03	2.6581E-01	4.0446E-03	-2.1860E-02	-9.6934E-05
3.987	6.4437E-02	1.5129E-01	3.7203E+00	1.2652E-02	3.0467E-01	8.7040E-03	2.5442E-01	4.0477E-03	-2.0294E-02	-2.8904E-04
4.196	6.8016E-02	1.4167E-01	3.8447E+00	1.2659E-02	3.0906E-01	8.1356E-03	2.5323E-01	4.0478E-03	-1.9111E-02	-4.4611E-04
4.405	7.0665E-02	1.3348E-01	3.9378E+00	1.2732E-02	3.1276E-01	7.6349E-03	2.5457E-01	3.9887E-03	-1.8211E-02	-5.4950E-04
4.615	7.2586E-02	1.2626E-01	4.0066E+00	1.2802E-02	3.1591E-01	7.1908E-03	2.5783E-01	3.9065E-03	-1.7454E-02	-6.10[illegible]1E-04
4.824	7.3994E-02	1.1982E-01	4.0767E+00	1.2864E-02	3.2005E-01	6.7948E-03	2.6788E-01	3.8122E-03	-1.6804E-02	-6.6060E-04
5.034	7.4986E-02	1.1403E-01	4.1440E+00	1.2940E-02	3.2576E-01	6.4424E-03	2.8397E-01	3.7068E-03	-1.6266E-02	-6.6997E-04
5.243	7.5596E-02	1.0875E-01	4.1908E+00	1.2972E-02	3.3035E-01	6.1213E-03	2.9822E-01	3.6099E-03	-1.5768E-02	-6.7535E-04
5.452	7.5929E-02	1.0393E-01	4.2321E+00	1.2970E-02	3.3479E-01	5.8280E-03	3.0804E-01	3.5195E-03	-1.5283E-02	-6.7733E-04
5.662	7.6103E-02	9.9539E-02	4.2895E+00	1.2951E-02	3.3986E-01	5.5658E-03	3.1646E-01	3.4197E-03	-1.4856E-02	-6.6636E-04
5.871	7.6064E-02	9.5497E-02	4.3299E+00	1.2908E-02	3.4390E-01	5.3247E-03	3.2389E-01	3.3263E-03	-1.4451E-02	-6.9561E-04
6.081	7.5846E-02	9.2172E-02	4.3535E+00	1.2886E-02	3.4639E-01	5.1147E-03	3.2908E-01	3.2759E-03	-1.4157E-02	-6.4282E-04
6.290	7.5491E-02	9.0012E-02	4.3655E+00	1.2914E-02	3.4814E-01	4.9646E-03	3.3348E-01	3.3861E-03	-1.4048E-02	-6.9674E-04
6.499	7.5024E-02	8.7939E-02	4.3672E+00	1.2906E-02	3.4903E-01	4.8241E-03	3.3678E-01	3.4734E-03	-1.3925E-02	-6.6873E-04
6.709	7.4469E-02	8.5945E-02	4.3606E+00	1.2876E-02	3.4931E-01	4.6911E-03	3.3932E-01	3.5436E-03	-1.3797E-02	-6.5905E-04
6.918	7.3844E-02	8.4027E-02	4.3473E+00	1.2827E-02	3.4907E-01	4.5649E-03	3.4121E-01	3.5992E-03	-1.3659E-02	-6.5797E-04
7.128	7.3164E-02	8.2183E-02	4.3285E+00	1.2762E-02	3.4842E-01	4.4452E-03	3.4256E-01	3.6424E-03	-1.3512E-02	-6.5572E-04
7.337	7.2441E-02	8.0324E-02	4.3052E+00	1.2690E-02	3.4743E-01	4.3190E-03	3.4347E-01	3.7076E-03	-1.3348E-02	-6.5813E-04
7.546	7.2149E-02	7.8543E-02	4.2794E+00	1.2608E-02	3.4632E-01	4.1997E-03	3.4357E-01	3.7600E-03	-1.3179E-02	-6.5914E-04
7.756	7.1790E-02	7.6834E-02	4.2534E+00	1.2517E-02	3.4512E-01	4.0869E-03	3.4236E-01	3.8013E-03	-1.3010E-02	-6.5899E-04
7.965	7.1371E-02	7.5194E-02	4.2247E+00	1.2420E-02	3.4374E-01	3.9802E-03	3.4109E-01	3.8330E-03	-1.2848E-02	-6.5788E-04
8.175	7.1068E-02	7.3620E-02	4.1966E+00	1.2318E-02	3.4250E-01	3.8790E-03	3.3890E-01	3.8562E-03	-1.2670E-02	-6.5600E-04
8.384	7.0708E-02	7.2108E-02	4.1666E+00	1.2213E-02	3.4115E-01	3.7830E-03	3.3604E-01	3.8728E-03	-1.2500E-02	-6.5356E-04
8.593	7.0331E-02	7.0654E-02	4.1352E+00	1.2106E-02	3.3977E-01	3.6919E-03	3.3498E-01	3.8814E-03	-1.2332E-02	-6.5075E-04
8.803	6.9854E-02	6.9257E-02	4.1030E+00	1.1998E-02	3.3843E-01	3.6053E-03	3.3343E-01	3.8849E-03	-1.2165E-02	-6.4782E-04
9.012	6.9375E-02	6.9287E-02	4.0704E+00	1.1935E-02	3.3725E-01	3.5452E-03	3.3237E-01	4.0282E-03	-1.2198E-02	-6.6627E-04
9.222	6.8887E-02	6.9599E-02	4.0432E+00	1.1889E-02	3.3685E-01	3.4845E-03	3.3122E-01	4.0561E-03	-1.2279E-02	-6.7012E-04
9.431	6.8418E-02	7.0327E-02	4.0304E+00	1.1871E-02	3.3750E-01	3.4671E-03	3.3048E-01	4.1508E-03	-1.2409E-02	-6.7781E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(NC)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.265	9.7910E-02	6.8056E-02	7.3523E+00	3.2649E-03	6.3599E-01	3.4063E-03	6.8498E-01	6.6092E-03	-1.4221E-02	-8.4181E-04
1.474	1.0009E-01	1.2966E-01	7.6168E+00	6.0795E-03	6.6294E-01	6.4942E-03	7.2608E-01	1.2274E-02	-2.6768E-02	-1.5077E-03
1.683	1.0015E-01	2.1291E-01	7.7371E+00	9.7593E-03	6.7798E-01	1.0680E-02	7.5509E-01	1.9351E-02	-4.3415E-02	-2.2511E-03
1.893	9.8533E-02	3.0893E-01	7.7404E+00	1.3846E-02	6.8332E-01	1.5548E-02	7.7646E-01	2.6545E-02	-6.2201E-02	-2.8574E-03
2.102	9.5584E-02	4.0566E-01	7.6483E+00	1.7771E-02	6.8075E-01	2.0508E-02	7.8926E-01	3.2532E-02	-8.8612E-02	-3.1587E-03
2.312	9.1604E-02	4.9324E-01	7.4788E+00	2.1094E-02	6.7168E-01	2.5086E-02	7.9544E-01	3.6585E-02	-9.6660E-02	-3.0816E-03
2.521	8.6851E-02	5.6644E-01	7.2474E+00	2.3604E-02	6.5730E-01	2.9037E-02	7.9585E-01	3.8652E-02	-1.0936E-01	-2.7116E-03
2.730	8.1550E-02	6.2412E-01	6.9673E+00	2.5269E-02	6.3864E-01	3.2276E-02	7.9125E-01	3.9067E-02	-1.1857E-01	-2.1461E-03
2.940	7.5888E-02	6.6743E-01	6.6495E+00	2.6232E-02	6.1654E-01	3.4839E-02	7.8238E-01	3.8265E-02	-1.2463E-01	-1.4824E-03
3.149	7.0011E-02	6.9844E-01	6.3033E+00	2.6576E-02	5.9173E-01	3.6807E-02	7.7002E-01	3.6621E-02	-1.2805E-01	-7.8878E-04
3.359	6.4083E-02	7.1926E-01	5.9585E+00	2.6446E-02	5.6631E-01	3.8269E-02	7.4917E-01	3.4412E-02	-1.2931E-01	-1.0483E-04
3.568	5.8782E-02	7.3173E-01	5.6438E+00	2.5953E-02	5.4097E-01	3.9304E-02	7.1826E-01	3.1820E-02	-1.2885E-01	5.5284E-04
3.777	5.3671E-02	7.3119E-01	5.3448E+00	2.5174E-02	5.1517E-01	3.9655E-02	6.8260E-01	2.7571E-02	-1.2664E-01	1.2358E-03
3.987	5.0262E-02	7.2364E-01	5.0569E+00	2.4291E-02	4.8968E-01	3.9779E-02	6.4239E-01	2.3317E-02	-1.2372E-01	1.7825E-03
4.196	4.7176E-02	7.1465E-01	4.7927E+00	2.3467E-02	4.6454E-01	3.9831E-02	6.0208E-01	1.9774E-02	-1.2114E-01	2.1348E-03
4.405	4.4350E-02	7.0396E-01	4.5417E+00	2.2638E-02	4.3969E-01	3.9778E-02	5.6063E-01	1.7036E-02	-1.1841E-01	2.3452E-03
4.615	4.1748E-02	6.9317E-01	4.3027E+00	2.1827E-02	4.1523E-01	3.9647E-02	5.1872E-01	1.4839E-02	-1.1571E-01	2.4591E-03
4.824	3.9350E-02	6.8254E-01	4.0781E+00	2.1051E-02	3.9148E-01	3.9448E-02	4.7750E-01	1.3074E-02	-1.1312E-01	2.5068E-03
5.034	3.7181E-02	6.7190E-01	3.8824E+00	2.0327E-02	3.7069E-01	3.9139E-02	4.4305E-01	1.1792E-02	-1.1068E-01	2.5214E-03
5.243	3.5176E-02	6.6202E-01	3.6990E+00	1.9639E-02	3.5068E-01	3.8836E-02	4.0965E-01	1.0652E-02	-1.0830E-01	2.5058E-03
5.452	3.3273E-02	6.5282E-01	3.5090E+00	1.8986E-02	3.3018E-01	3.8536E-02	3.8199E-01	9.6408E-03	-1.0619E-01	2.4633E-03
5.662	3.1402E-02	6.4370E-01	3.2946E+00	1.8351E-02	3.1111E-01	3.8142E-02	3.6271E-01	8.9680E-03	-1.0409E-01	2.3840E-03
5.871	2.9660E-02	6.3518E-01	3.0938E+00	1.7750E-02	2.9291E-01	3.7763E-02	3.4389E-01	8.3687E-03	-1.0210E-01	2.2920E-03
6.081	2.8111E-02	6.2491E-01	2.9328E+00	1.7141E-02	2.8198E-01	3.7304E-02	3.3886E-01	7.7244E-03	-9.9877E-02	2.2788E-03
6.290	2.6663E-02	6.0699E-01	2.7816E+00	1.6379E-02	2.7150E-01	3.6454E-02	3.3367E-01	5.5971E-03	-9.6334E-02	2.4695E-03
6.499	2.5361E-02	5.9006E-01	2.6605E+00	1.5672E-02	2.6750E-01	3.5607E-02	3.3970E-01	3.7020E-03	-9.3117E-02	2.7809E-03
6.709	2.4140E-02	5.7417E-01	2.5466E+00	1.5007E-02	2.6364E-01	3.4810E-02	3.4515E-01	1.9305E-03	-9.0094E-02	2.9134E-03
6.918	2.2993E-02	5.5923E-01	2.4393E+00	1.4380E-02	2.5990E-01	3.4059E-02	3.5008E-01	2.7152E-04	-8.7246E-02	3.1086E-03
7.128	2.1912E-02	5.4516E-01	2.3380E+00	1.3788E-02	2.5627E-01	3.3348E-02	3.5455E-01	-1.2846E-03	-8.4557E-02	3.2877E-03
7.337	2.0892E-02	5.3235E-01	2.2422E+00	1.3300E-02	2.5276E-01	3.2743E-02	3.5859E-01	-2.9242E-03	-8.2148E-02	3.5082E-03
7.546	1.9577E-02	5.2024E-01	2.1498E+00	1.2838E-02	2.4913E-01	3.2168E-02	3.6281E-01	-4.4673E-03	-7.9848E-02	3.6960E-03
7.756	1.8346E-02	5.0877E-01	2.0660E+00	1.2398E-02	2.4568E-01	3.1622E-02	3.6871E-01	-5.9216E-03	-7.7671E-02	3.8759E-03
7.965	1.7178E-02	4.9790E-01	1.9863E+00	1.1980E-02	2.4229E-01	3.1100E-02	3.7410E-01	-7.2939E-03	-7.5598E-02	4.0484E-03
8.175	1.6080E-02	4.8757E-01	1.9095E+00	1.1581E-02	2.3887E-01	3.0603E-02	3.7917E-01	-8.5904E-03	-7.3620E-02	4.1897E-03
8.384	1.5035E-02	4.7775E-01	1.8361E+00	1.1199E-02	2.3544E-01	3.0126E-02	3.8368E-01	-9.8166E-03	-7.1726E-02	4.3231E-03
8.593	1.4040E-02	4.6840E-01	1.7655E+00	1.0832E-02	2.3194E-01	2.9670E-02	3.8757E-01	-1.0977E-02	-6.9907E-02	4.4394E-03
8.803	1.3090E-02	4.5948E-01	1.6974E+00	1.0479E-02	2.2830E-01	2.9232E-02	3.9074E-01	-1.2077E-02	-6.8149E-02	4.5356E-03
9.012	1.2181E-02	4.4364E-01	1.6311E+00	9.9477E-03	2.2435E-01	2.8643E-02	3.9296E-01	-1.4019E-02	-6.5606E-02	4.7030E-03
9.222	1.1499E-02	4.2394E-01	1.4962E+00	9.3357E-03	2.0868E-01	2.8056E-02	3.5966E-01	-1.5588E-02	-6.2556E-02	4.0000E-03
9.431	1.0472E-02	4.3465E-01	1.5053E+00	9.3282E-03	2.0012E-01	3.1191E-02	3.3577E-01	-5.2258E-03	-6.3279E-02	3.3021E-03

TEST 1900

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   11.1100
BEAM AT MIDSHIP=     3.6800

DISPLACED VOLUME/(L/2)**3=   .732330E-01
LONGITUDINAL CENTER OF BUOYANCY/(L/2)=   .802714E+00
VERTICAL CENTER OF BUOYANCY/L=  -.194846E-01
METACENTER HEIGHT OVER WATE-PLANE/L=   .249950E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .329853E+02
HEAVE-PITCH RESTORING COEFFICIENT=  -.341230E+01
PITCH-PITCH RESTORING COEFFICIENT=   .282559E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .854000E+00
TOTAL MASS=     .0109
(ROLL-RADIUS OF GYRATION/L)**2=   .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .165000E+00
(YAW-RADIUS OF GYRATION/L)**2=   .116500E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.289	7.5810E-02	4.4659E-01	5.2479E+00	1.9077E-02	4.6345E-01	1.5234E-02	-5.9565E-01	-1.9994E-02	-5.8367E-02	-6.4805E-04
1.501	6.7252E-02	4.5692E-01	4.6832E+00	1.9227E-02	4.1531E-01	1.5637E-02	-5.3615E-01	-2.0469E-02	-5.9431E-02	-6.9290E-04
1.713	6.0876E-02	4.5378E-01	4.2682E+00	1.8981E-02	3.7939E-01	1.5672E-02	-4.9108E-01	-2.0010E-02	-5.8371E-02	-7.9823E-04
1.925	5.6085E-02	4.3513E-01	3.9618E+00	1.8315E-02	3.5227E-01	1.5255E-02	-4.5627E-01	-1.8505E-02	-5.4995E-02	-9.5516E-04
2.137	5.2483E-02	4.0369E-01	3.7367E+00	1.7330E-02	3.3170E-01	1.4433E-02	-4.2897E-01	-1.6203E-02	-4.9817E-02	-1.1283E-03
2.349	4.9797E-02	3.6506E-01	3.5738E+00	1.6188E-02	3.1610E-01	1.3341E-02	-4.0728E-01	-1.3548E-02	-4.3730E-02	-1.2768E-03
2.561	4.7830E-02	3.2471E-01	3.4593E+00	1.5040E-02	3.0437E-01	1.2134E-02	-3.8990E-01	-1.0938E-02	-3.7566E-02	-1.3753E-03
2.773	4.6435E-02	2.8642E-01	3.3828E+00	1.3986E-02	2.9567E-01	1.0933E-02	-3.7590E-01	-8.6139E-03	-3.1875E-02	-1.4183E-03
2.985	4.5499E-02	2.5210E-01	3.3361E+00	1.3074E-02	2.8939E-01	9.8089E-03	-3.6461E-01	-6.6652E-03	-2.6914E-02	-1.4130E-03
3.197	4.4929E-02	2.2236E-01	3.3127E+00	1.2314E-02	2.8502E-01	8.7971E-03	-3.5554E-01	-5.0921E-03	-2.2746E-02	-1.3716E-03
3.409	4.5558E-02	1.9709E-01	3.3960E+00	1.1698E-02	2.8441E-01	7.9064E-03	-3.3487E-01	-3.8540E-03	-1.9324E-02	-1.3059E-03
3.621	4.6301E-02	1.7589E-01	3.4913E+00	1.1210E-02	2.8437E-01	7.1329E-03	-3.1921E-01	-2.8988E-03	-1.6559E-02	-1.2254E-03
3.833	4.7585E-02	1.6078E-01	3.6147E+00	1.0966E-02	2.8580E-01	6.5380E-03	-3.0815E-01	-2.5874E-03	-1.4782E-02	-1.0691E-03
4.045	4.8727E-02	1.4948E-01	3.7284E+00	1.0883E-02	2.8772E-01	6.0694E-03	-3.0382E-01	-2.5479E-03	-1.3627E-02	-8.9416E-04
4.257	5.0750E-02	1.4099E-01	3.8472E+00	1.0932E-02	2.9169E-01	5.6580E-03	-3.0004E-01	-2.5152E-03	-1.2966E-02	-7.5079E-04
4.469	5.2310E-02	1.3386E-01	3.9360E+00	1.1065E-02	2.9508E-01	5.3082E-03	-2.9835E-01	-2.4229E-03	-1.2582E-02	-6.4190E-04
4.681	5.3583E-02	1.2750E-01	4.0142E+00	1.1187E-02	2.9880E-01	5.0014E-03	-3.0146E-01	-2.3105E-03	-1.2272E-02	-5.6321E-04
4.893	5.4616E-02	1.2176E-01	4.0819E+00	1.1297E-02	3.0294E-01	4.7282E-03	-[illegible]0833E-01	-2.1976E-03	-1.2008E-02	-5.0684E-04
5.105	5.5390E-02	1.1650E-01	4.1299E+00	1.1363E-02	3.0639E-01	4.4809E-03	-3.1474E-01	-2.0963E-03	-1.1746E-02	-4.5729E-04
5.317	5.6399E-02	1.1236E-01	4.1749E+00	1.1451E-02	3.1084E-01	4.2790E-03	-3.2199E-01	-2.0851E-03	-1.1609E-02	-4.0746E-04
5.529	5.7112E-02	1.0850E-01	4.2040E+00	1.1499E-02	3.1443E-01	4.0938E-03	-3.2868E-01	-2.0707E-03	-1.1459E-02	-3.6379E-04
5.741	5.7728E-02	1.0491E-01	4.2458E+00	1.1532E-02	3.1841E-01	3.9264E-03	-3.3705E-01	-2.0458E-03	-1.1323E-02	-3.3468E-04
5.953	5.8550E-02	1.0154E-01	4.2997E+00	1.1536E-02	3.2239E-01	3.7716E-03	-3.4109E-01	-2.0199E-03	-1.1176E-02	-3.0868E-04
6.165	5.9136E-02	9.8381E-02	4.3382E+00	1.1518E-02	3.2558E-01	3.6283E-03	-3.4476E-01	-1.9931E-03	-1.1023E-02	-2.8543E-04
6.377	5.9527E-02	9.5545E-02	4.3640E+00	1.1494E-02	3.2812E-01	3.4965E-03	-3.4813E-01	-1.9524E-03	-1.0890E-02	-2.6708E-04
6.589	5.9717E-02	9.2865E-02	4.3726E+00	1.1446E-02	3.2877E-01	3.3739E-03	-3.4825E-01	-1.9127E-03	-1.0779E-02	-2.6296E-04
6.801	5.9775E-02	9.0524E-02	4.3729E+00	1.1395E-02	3.2905E-01	3.2772E-03	-3.4830E-01	-1.9336E-03	-1.0686E-02	-2.5108E-04
7.013	5.9723E-02	8.8292E-02	4.3662E+00	1.1332E-02	3.2901E-01	3.1859E-03	-3.4832E-01	-1.9487E-03	-1.0585E-02	-2.4013E-04
7.225	5.9581E-02	8.6162E-02	4.3539E+00	1.1261E-02	3.2874E-01	3.0993E-03	-3.4833E-01	-1.9588E-03	-1.0477E-02	-2.3002E-04
7.437	5.9365E-02	3.4127E-02	4.3370E+00	1.1181E-02	3.2827E-01	3.0173E-03	-3.4836E-01	-1.9648E-03	-1.0364E-02	-2.2066E-04
7.649	5.9087E-02	8.2559E-02	4.3163E+00	1.1112E-02	3.2766E-01	2.9433E-03	-3.4842E-01	-2.0053E-03	-1.0289E-02	-2.0775E-04
7.861	5.8753E-02	8.1267E-02	4.2915E+00	1.1044E-02	3.2690E-01	2.8780E-03	-3.4832E-01	-2.0738E-03	-1.0228E-02	-1.9273E-04
8.073	5.8378E-02	7.9995E-02	4.2644E+00	1.0971E-02	3.2609E-01	2.8155E-03	-3.4834E-01	-2.1324E-03	-1.0158E-02	-1.7897E-04
8.285	5.7971E-02	7.8746E-02	4.2355E+00	1.0894E-02	3.2525E-01	2.7555E-03	-3.4850E-01	-2.1823E-03	-1.0083E-02	-1.6631E-04
8.497	5.7538E-02	7.7520E-02	4.2053E+00	1.0815E-02	3.2443E-01	2.6980E-03	-3.4883E-01	-2.2246E-03	-1.0002E-02	-1.5461E-04
8.709	5.7085E-02	7.6319E-02	4.1742E+00	1.0734E-02	3.2366E-01	2.6428E-03	-3.4939E-01	-2.2602E-03	-9.9166E-03	-1.4372E-04
8.921	5.6619E-02	7.5143E-02	4.1427E+00	1.0654E-02	3.2298E-01	2.5898E-03	-3.5024E-01	-2.2898E-03	-9.8277E-03	-1.3350E-04
9.133	5.6142E-02	7.3994E-02	4.1111E+00	1.0574E-02	3.2247E-01	2.5389E-03	-3.5145E-01	-2.3140E-03	-9.7356E-03	-1.2379E-04
9.345	5.5661E-02	7.3664E-02	4.0799E+00	1.0525E-02	3.2219E-01	2.4950E-03	-3.5317E-01	-2.2792E-03	-9.7486E-03	-1.2004E-04
9.557	5.6771E-02	7.2030E-02	4.0730E+00	1.0491E-02	3.2441E-01	2.3104E-03	-3.4982E-01	-2.7076E-03	-9.4953E-03	-2.2644E-05

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.289	1.0932E-01	7.8133E-02	7.2881E+00	2.3964E-03	6.2175E-01	2.2869E-03	-7.7915E-01	-4.7543E-03	-1.2365E-02	1.9603E-04
1.501	1.1391E-01	1.5094E-01	7.5515E+00	4.4811E-03	6.5044E-01	4.4504E-03	-8.2316E-01	-9.2546E-03	-2.3461E-02	3.6817E-04
1.713	1.1641E-01	2.5172E-01	7.6708E+00	7.2457E-03	6.6795E-01	7.5125E-03	-8.5514E-01	-1.5427E-02	-3.8419E-02	5.6283E-04
1.925	1.1717E-01	3.7028E-01	7.6723E+00	1.0365E-02	6.7640E-01	1.1239E-02	-8.7752E-01	-2.2462E-02	-5.5516E-02	6.9772E-04
2.137	1.1648E-01	4.9112E-01	7.5776E+00	1.3404E-02	6.7742E-01	1.5213E-02	-8.9208E-01	-2.9205E-02	-7.2352E-02	6.8919E-04
2.349	1.1458E-01	6.0062E-01	7.4050E+00	1.6006E-02	6.7234E-01	1.9021E-02	-9.0012E-01	-3.4742E-02	-8.6936E-02	5.0124E-04
2.561	1.1170E-01	6.9129E-01	7.1701E+00	1.7988E-02	6.6228E-01	2.2386E-02	-9.0261E-01	-3.8688E-02	-9.8257E-02	1.5426E-04
2.773	1.0801E-01	7.6139E-01	6.8869E+00	1.9326E-02	6.4818E-01	2.5193E-02	-9.0030E-01	-4.1093E-02	-1.0618E-01	-3.0083E-04
2.985	1.0368E-01	8.1260E-01	6.5674E+00	2.0089E-02	6.3085E-01	2.7439E-02	-8.9381E-01	-4.2218E-02	-1.1107E-01	-8.1057E-04
3.197	9.8867E-02	8.4786E-01	6.2220E+00	2.0379E-02	6.1100E-01	2.9179E-02	-8.8367E-01	-4.2360E-02	-1.1346E-01	-1.3333E-03
3.409	9.3810E-02	8.7020E-01	5.8719E+00	2.0303E-02	5.8954E-01	3.0484E-02	-8.6843E-01	-4.1780E-02	-1.1388E-01	-1.8416E-03
3.621	8.8721E-02	8.8223E-01	5.5456E+00	1.9950E-02	5.6689E-01	3.1427E-02	-8.4873E-01	-4.0678E-02	-1.1277E-01	-2.3205E-03
3.833	8.3842E-02	8.7505E-01	5.2472E+00	1.9398E-02	5.4390E-01	3.1775E-02	-8.2528E-01	-3.7470E-02	-1.1019E-01	-2.8068E-03
4.045	7.9065E-02	8.5801E-01	4.9664E+00	1.8725E-02	5.2065E-01	3.1731E-02	-8.0052E-01	-3.3608E-02	-1.0674E-01	-3.2353E-03
4.257	7.4449E-02	8.3558E-01	4.7044E+00	1.8026E-02	4.9775E-01	3.1590E-02	-7.7363E-01	-3.0257E-02	-1.0310E-01	-3.5726E-03
4.469	7.0057E-02	8.1106E-01	4.4547E+00	1.7323E-02	4.7496E-01	3.1231E-02	-7.4535E-01	-2.7317E-02	-9.9435E-02	-3.8103E-03
4.681	6.5882E-02	7.8772E-01	4.2178E+00	1.6630E-02	4.5248E-01	3.0827E-02	-7.1643E-01	-2.4873E-02	-9.5922E-02	-3.9841E-03
4.893	6.1927E-02	7.6581E-01	3.9960E+00	1.5969E-02	4.3065E-01	3.0399E-02	-6.8806E-01	-2.2780E-02	-9.2622E-02	-4.1241E-03
5.105	5.8162E-02	7.4557E-01	3.7860E+00	1.5326E-02	4.0931E-01	2.9985E-02	-6.5982E-01	-2.0873E-02	-8.9509E-02	-4.2341E-03
5.317	5.4146E-02	7.2361E-01	3.5931E+00	1.4691E-02	3.8924E-01	2.9408E-02	-6.3569E-01	-1.8864E-02	-8.6380E-02	-4.3241E-03
5.529	5.0417E-02	7.0329E-01	3.4114E+00	1.4084E-02	3.6984E-01	2.8867E-02	-6.1164E-01	-1.7027E-02	-8.3453E-02	-4.3906E-03
5.741	4.6912E-02	6.8417E-01	3.2245E+00	1.3504E-02	3.5363E-01	2.8318E-02	-5.9501E-01	-1.5448E-02	-8.0740E-02	-4.4495E-03
5.953	4.3517E-02	6.6639E-01	3.0414E+00	1.2951E-02	3.3799E-01	2.7805E-02	-5.7756E-01	-1.3989E-02	-7.8201E-02	-4.4950E-03
6.165	4.0343E-02	6.4982E-01	2.8688E+00	1.2425E-02	3.2287E-01	2.7323E-02	-5.6023E-01	-1.2638E-02	-7.5818E-02	-4.5282E-03
6.377	3.7368E-02	6.3359E-01	2.7057E+00	1.1911E-02	3.0822E-01	2.6862E-02	-5.4302E-01	-1.1459E-02	-7.3406E-02	-4.5336E-03
6.589	3.4536E-02	6.1829E-01	2.5443E+00	1.1450E-02	2.9262E-01	2.6409E-02	-5.2285E-01	-1.0404E-02	-7.1365E-02	-4.6345E-03
6.801	3.1872E-02	6.0311E-01	2.3917E+00	1.1008E-02	2.7763E-01	2.5907E-02	-5.0327E-01	-9.1642E-03	-6.9326E-02	-4.7600E-03
7.013	2.9363E-02	5.8883E-01	2.2471E+00	1.0586E-02	2.6321E-01	2.5434E-02	-4.8425E-01	-8.0016E-03	-6.7403E-02	-4.8737E-03
7.225	2.6995E-02	5.7539E-01	2.1100E+00	1.0184E-02	2.4930E-01	2.4987E-02	-4.6574E-01	-6.9097E-03	-6.5584E-02	-4.9765E-03
7.437	2.4755E-02	5.6271E-01	1.9796E+00	9.7981E-03	2.3588E-01	2.4565E-02	-4.4772E-01	-5.8828E-03	-6.3860E-02	-5.0692E-03
7.649	2.2633E-02	5.4866E-01	1.8554E+00	9.4277E-03	2.2289E-01	2.4144E-02	-4.3013E-01	-4.7057E-03	-6.2098E-02	-5.1654E-03
7.861	2.0576E-02	5.3337E-01	1.7285E+00	9.0665E-03	2.0997E-01	2.3697E-02	-4.1127E-01	-3.2934E-03	-6.0330E-02	-5.2658E-03
8.073	1.8621E-02	5.1887E-01	1.6072E+00	8.7190E-03	1.9742E-01	2.3273E-02	-3.9283E-01	-1.9582E-03	-5.8647E-02	-5.3565E-03
8.285	1.6760E-02	5.0511E-01	1.4910E+00	8.3838E-03	1.8521E-01	2.2869E-02	-3.7477E-01	-6.9454E-04	-5.7041E-02	-5.4378E-03
8.497	1.4986E-02	4.9202E-01	1.3795E+00	8.0598E-03	1.7328E-01	2.2484E-02	-3.5701E-01	5.0288E-04	-5.5505E-02	-5.5100E-03
8.709	1.3290E-02	4.7957E-01	1.2723E+00	7.7456E-03	1.6158E-01	2.2116E-02	-3.3947E-01	1.6388E-03	-5.4033E-02	-5.5732E-03
8.921	1.1668E-02	4.6771E-01	1.1689E+00	7.4397E-03	1.5005E-01	2.1763E-02	-3.2207E-01	2.7173E-03	-5.2618E-02	-5.6270E-03
9.133	1.0112E-02	4.5638E-01	1.0688E+00	7.1407E-03	1.3864E-01	2.1425E-02	-3.0468E-01	3.7425E-03	-5.1255E-02	-5.6709E-03
9.345	8.6163E-03	4.3569E-01	9.7151E-01	6.6863E-03	1.2724E-01	2.1057E-02	-2.8716E-01	4.5293E-03	-4.9083E-02	-5.6830E-03
9.557	2.0749E-02	4.2115E-01	1.1037E+00	7.5288E-03	1.2501E-01	2.1504E-02	-2.1131E-01	8.1675E-03	-4.8941E-02	-6.5816E-03

TEST 2000

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   13.2300
BEAM AT MIDSHIP=    5.1738

DISPLACED VOLUME/(L/2)**3=   .933320E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=   .127107E+01
VERTICAL CENTER OF BOYANCY/L=  -.251971E-01
METACENTER HEIGHT OVER WATER-PLANE/L=   .226645E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .246245E+02
HEAVE-PITCH RESTORING COEFFICIENT=   .950845E+00
PITCH-PITCH RESTORING COEFFICIENT=   .142564E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .530000E+00
TOTAL MASS=     .0230
(ROLL-RADIUS OF GYRATION/L)**2=   .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .804000E-01
(YAW-RADIUS OF GYRATION/L)**2=   .864000E-01
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(RD)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.344	1.5274E-01	5.3107E-01	3.7266E+00	2.2971E-02	1.7379E-01	3.5790E-02	1.5261E-02	-2.3433E-02	-9.5340E-02	-2.5125E-03
1.554	1.3418E-01	5.3001E-01	3.3286E+00	2.2746E-02	1.5446E-01	3.6125E-02	1.4077E-02	-2.4827E-02	-9.4549E-02	-2.3240E-03
1.763	1.1597E-01	5.1618E-01	3.0757E+00	2.1871E-02	1.3594E-01	3.5876E-02	9.6663E-03	-2.6980E-02	-9.0970E-02	-1.9583E-03
1.973	1.0854E-01	4.9168E-01	2.6187E+00	2.0455E-02	1.2855E-01	3.5053E-02	5.1483E-03	-2.9315E-02	-8.5191E-02	-1.4971E-03
2.182	1.0032E-01	4.6090E-01	2.6594E+00	1.8873E-02	1.2061E-01	3.3761E-02	5.8284E-04	-3.1757E-02	-7.8279E-02	-1.0405E-03
2.392	9.3570E-02	4.2815E-01	2.5409E+00	1.7240E-02	1.1431E-01	3.2215E-02	-3.9887E-03	-3.2711E-02	-7.1224E-02	-6.5665E-04
2.601	8.8302E-02	3.9648E-01	2.4561E+00	1.5743E-02	1.0959E-01	3.0495E-02	-8.5242E-03	-3.3285E-02	-6.4674E-02	-3.6933E-04
2.811	8.4221E-02	3.6755E-01	2.3966E+00	1.4447E-02	1.0610E-01	2.9730E-02	-1.2973E-02	-3.3174E-02	-5.8933E-02	-1.7276E-04
3.020	8.1097E-02	3.4234E-01	2.3563E+00	1.3364E-02	1.0357E-01	2.7000E-02	-1.7272E-02	-3.2555E-02	-5.4077E-02	-4.8924E-05
3.229	8.9108E-02	3.2005E-01	2.4381E+00	1.2479E-02	1.0852E-01	2.5362E-02	-4.8258E-02	-3.1610E-02	-5.0059E-02	2.1471E-05
3.439	9.4883E-02	3.0140E-01	2.5562E+00	1.1766E-02	1.1333E-01	2.3851E-02	-7.4854E-02	-3.0492E-02	-4.6785E-02	5.4603E-05
3.648	9.9030E-02	2.8577E-01	2.6717E+00	1.1198E-02	1.1705E-01	2.2488E-02	-8.9569E-02	-2.9317E-02	-4.4143E-02	6.2643E-05
3.858	1.0201E-01	2.7365E-01	2.7635E+00	1.0811E-02	1.2045E-01	2.1350E-02	-9.6639E-02	-2.7914E-02	-4.2249E-02	-8.9748E-06
4.067	1.0402E-01	2.6384E-01	2.8264E+00	1.0515E-02	1.2301E-01	2.0345E-02	-1.0059E-01	-2.6621E-02	-4.0766E-02	-7.4519E-05
4.277	1.0529E-01	2.5656E-01	2.8663E+00	1.0353E-02	1.2487E-01	1.9460E-02	-1.0247E-01	-2.5514E-02	-3.9779E-02	-1.2582E-04
4.486	1.0684E-01	2.5463E-01	2.8891E+00	1.0205E-02	1.2608E-01	1.8694E-02	-1.0382E-01	-2.4644E-02	-3.8935E-02	-1.5267E-04
4.696	1.0773E-01	2.4609E-01	2.9154E+00	1.0087E-02	1.2685E-01	1.8062E-02	-1.0613E-01	-2.4070E-02	-3.8287E-02	-1.3810E-04
4.905	1.0815E-01	2.4099E-01	2.9529E+00	9.9604E-03	1.2730E-01	1.7469E-02	-1.0775E-01	-2.3759E-02	-3.7219E-02	-3.2161E-05
5.115	1.0819E-01	2.3799E-01	2.9876E+00	9.6239E-03	1.2744E-01	1.7041E-02	-1.0778E-01	-2.3303E-02	-3.6650E-02	-5.7693E-05
5.324	1.0788E-01	2.3381E-01	3.0044E+00	9.7392E-03	1.2713E-01	1.6686E-02	-1.0790E-01	-2.3077E-02	-3.6322E-02	-8.1151E-05
5.534	1.0729E-01	2.3165E-01	3.0059E+00	9.7124E-03	1.2650E-01	1.6393E-02	-1.0771E-01	-2.2637E-02	-3.6173E-02	-1.4585E-04
5.743	1.0652E-01	2.2937E-01	3.0249E+00	9.6429E-03	1.2689E-01	1.6146E-02	-1.1114E-01	-2.2378E-02	-3.5835E-02	-1.8326E-04
5.953	1.0566E-01	2.2624E-01	3.0379E+00	9.4286E-03	1.2723E-01	1.5871E-02	-1.1219E-01	-2.2305E-02	-3.4852E-02	-4.4899E-05
6.162	1.0469E-01	2.1945E-01	3.0356E+00	9.2543E-03	1.2734E-01	1.5509E-02	-1.1363E-01	-2.2926E-02	-3.3410E-02	-4.6046E-05
6.372	1.0363E-01	2.1822E-01	3.0320E+00	9.2826E-03	1.2736E-01	1.5411E-02	-1.1360E-01	-2.2448E-02	-3.4148E-02	-2.5845E-04
6.581	1.0250E-01	2.1659E-01	3.0229E+00	9.2832E-03	1.2714E-01	1.5312E-02	-1.1327E-01	-2.1984E-02	-3.4075E-02	-3.6956E-04
6.791	1.0178E-01	2.1613E-01	3.0102E+00	9.2903E-03	1.2685E-01	1.5257E-02	-1.1274E-01	-2.1748E-02	-3.4049E-02	-4.4802E-04
7.000	1.0099E-01	2.1496E-01	2.9587E+00	9.2781E-03	1.2659E-01	1.5183E-02	-1.1262E-01	-2.1530E-02	-3.3951E-02	-5.1157E-04
7.210	1.0013E-01	2.1409E-01	2.9836E+00	9.2563E-03	1.2617E-01	1.5157E-02	-1.1229E-01	-2.1298E-02	-3.3852E-02	-5.7330E-04
7.419	9.9202E-02	2.1268E-01	2.9655E+00	9.2210E-03	1.2563E-01	1.5103E-02	-1.1172E-01	-2.1111E-02	-3.3698E-02	-6.2340E-04
7.628	9.8381E-02	2.1150E-01	2.9537E+00	9.1755E-03	1.2572E-01	1.5039E-02	-1.0848E-01	-2.0922E-02	-3.3510E-02	-6.6721E-04
7.838	9.7507E-02	2.1019E-01	2.9389E+00	9.1225E-03	1.2563E-01	1.4997E-02	-1.0542E-01	-2.0811E-02	-3.3305E-02	-7.0116E-04
8.047	9.6558E-02	2.0917E-01	2.9215E+00	9.0789E-03	1.2529E-01	1.4962E-02	-1.0264E-01	-2.0657E-02	-3.3162E-02	-7.3990E-04
8.257	9.5571E-02	2.0795E-01	2.9011E+00	9.0231E-03	1.2477E-01	1.4907E-02	-1.0024E-01	-2.0485E-02	-3.2977E-02	-7.7701E-04
8.466	9.4587E-02	2.0540E-01	2.8807E+00	8.9590E-03	1.2430E-01	1.4688E-02	-9.7844E-02	-1.9958E-02	-3.2729E-02	-8.2699E-04
8.676	9.3587E-02	2.0440E-01	2.8589E+00	8.9114E-03	1.2372E-01	1.4485E-02	-9.5554E-02	-1.9370E-02	-3.2629E-02	-8.8976E-04
8.885	9.2575E-02	2.0361E-01	2.8359E+00	8.9193E-03	1.2307E-01	1.4282E-02	-9.3362E-02	-1.8908E-02	-3.2710E-02	-9.2462E-04
9.095	9.1558E-02	2.0140E-01	2.8120E+00	8.8343E-03	1.2235E-01	1.4074E-02	-9.1261E-02	-1.8526E-02	-3.2417E-02	-9.4367E-04
9.304	9.0831E-02	1.9755E-01	2.7877E+00	8.6622E-03	1.2161E-01	1.3919E-02	-8.9360E-02	-1.8269E-02	-3.1682E-02	-9.7052E-04
9.514	1.0809E-01	2.0137E-01	2.8424E+00	8.8586E-03	1.2454E-01	1.3820E-02	-8.7191E-02	-1.7608E-02	-3.2692E-02	-1.0754E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

NE(RPD)	F(1,1)	F(2,2)	F(3,3)	F(4,4)	F(5,5)	F(6,6)	F(3,5)	F(2,6)	F(2,4)	F(4,6)
1.344	2.6466E-01	1.0120E-01	5.8820E+00	5.1190E-03	2.7551E-01	4.8886E-03	3.6419E-02	4.7874E-03	-2.1910E-02	-1.3440E-03
1.554	2.7685E-01	1.7583E-01	6.0576E+00	8.7674E-03	2.8634E-01	8.7398E-03	5.1747E-02	7.5073E-03	-3.7677E-02	-2.2180E-03
1.763	2.8489E-01	2.6590E-01	6.1346E+00	1.3022E-02	2.9254E-01	1.3710E-02	6.7750E-02	9.5753E-03	-5.6231E-02	-3.1081E-03
1.973	2.8943E-01	3.5591E-01	6.1321E+00	1.7251E-02	2.9495E-01	1.9388E-02	8.4223E-02	9.8923E-03	-7.4901E-02	-3.8031E-03
2.182	2.9391E-01	4.4742E-01	6.0655E+00	2.0929E-02	2.9424E-01	2.5312E-02	1.0097E-01	7.9379E-03	-9.1414E-02	-4.1842E-03
2.392	2.8983E-01	5.2219E-01	5.9474E+00	2.3796E-02	2.9098E-01	3.1095E-02	1.1779E-01	3.9219E-03	-1.0458E-01	-4.2513E-03
2.601	2.8649E-01	5.8232E-01	5.7880E+00	2.5822E-02	2.8564E-01	3.6462E-02	1.3449E-01	-1.5036E-03	-1.1419E-01	-4.0750E-03
2.811	2.8118E-01	6.2728E-01	5.5958E+00	2.7103E-02	2.7860E-01	4.1232E-02	1.5093E-01	-7.5958E-03	-1.2056E-01	-3.7394E-03
3.020	2.7414E-01	6.5946E-01	5.3775E+00	2.7777E-02	2.7017E-01	4.5298E-02	1.6704E-01	-1.3738E-02	-1.2425E-01	-3.3125E-03
3.229	2.5901E-01	6.8044E-01	5.1151E+00	2.7976E-02	2.5981E-01	4.8620E-02	1.8715E-01	-1.9511E-02	-1.2579E-01	-2.8391E-03
3.439	2.4510E-01	6.9202E-01	4.8329E+00	2.7811E-02	2.4912E-01	5.1201E-02	2.0314E-01	-2.4682E-02	-1.2565E-01	-2.3438E-03
3.648	2.3220E-01	6.9579E-01	4.5647E+00	2.7366E-02	2.3883E-01	5.3478E-02	2.1351E-01	-2.9170E-02	-1.2417E-01	-1.8357E-03
3.858	2.2019E-01	6.9015E-01	4.3215E+00	2.6613E-02	2.2987E-01	5.4065E-02	2.2227E-01	-3.3831E-02	-1.2112E-01	-1.1652E-03
4.067	2.0893E-01	6.7860E-01	4.0598E+00	2.5643E-02	2.1974E-01	5.4547E-02	2.2864E-01	-3.7768E-02	-1.1703E-01	-4.8869E-04
4.277	1.9831E-01	6.6181E-01	3.8976E+00	2.4463E-02	2.1052E-01	5.4632E-02	2.3374E-01	-4.0769E-02	-1.1203E-01	9.9468E-05
4.486	1.8830E-01	6.4158E-01	3.7131E+00	2.3152E-02	2.0266E-01	5.4340E-02	2.3794E-01	-4.2956E-02	-1.0649E-01	6.1330E-04
4.696	1.7912E-01	6.1724E-01	3.5455E+00	2.1691E-02	1.9493E-01	5.3625E-02	2.4110E-01	-4.4786E-02	-1.0015E-01	1.1570E-03
4.905	1.7066E-01	5.6920E-01	3.3963E+00	1.9198E-02	1.8768E-01	5.1659E-02	2.4345E-01	-5.1066E-02	-8.7957E-02	2.9441E-03
5.115	1.6285E-01	5.3756E-01	3.2610E+00	1.7447E-02	1.8090E-01	5.0646E-02	2.4552E-01	-5.2088E-02	-8.0391E-02	3.4204E-03
5.324	1.5563E-01	5.5551E-01	3.1340E+00	1.8581E-02	1.7455E-01	5.0212E-02	2.4703E-01	-4.6748E-02	-8.5953E-02	2.3233E-03
5.534	1.4876E-01	5.3113E-01	2.9903E+00	1.7307E-02	1.6772E-01	4.9122E-02	2.4346E-01	-4.6131E-02	-8.0420E-02	2.5210E-03
5.743	1.4216E-01	5.1267E-01	2.8312E+00	1.6403E-02	1.5980E-01	4.8020E-02	2.3804E-01	-4.4725E-02	-7.6497E-02	2.5481E-03
5.953	1.3586E-01	4.6859E-01	2.6744E+00	1.4529E-02	1.5168E-01	4.4615E-02	2.3042E-01	-5.0028E-02	-6.6521E-02	4.0497E-03
6.162	1.2991E-01	4.5463E-01	2.5243E+00	1.3216E-02	1.4365E-01	4.6941E-02	2.2194E-01	-3.9907E-02	-6.3416E-02	1.7426E-03
6.372	1.2425E-01	4.9434E-01	2.3801E+00	1.6011E-02	1.3589E-01	4.6465E-02	2.1257E-01	-3.0964E-02	-7.9137E-02	-7.2354E-04
6.581	1.1893E-01	4.7926E-01	2.2450E+00	1.5251E-02	1.2802E-01	4.5111E-02	2.0374E-01	-2.8520E-02	-7.5740E-02	-9.5360E-04
6.791	1.1266E-01	4.6550E-01	2.1174E+00	1.4769E-02	1.2081E-01	4.3561E-02	1.9663E-01	-2.6971E-02	-7.3323E-02	-1.1113E-03
7.000	1.0672E-01	4.6474E-01	2.0049E+00	1.4405E-02	1.1396E-01	4.3595E-02	1.8657E-01	-2.1132E-02	-7.2002E-02	-1.5951E-03
7.210	1.0110E-01	4.5102E-01	1.8987E+00	1.3965E-02	1.0746E-01	4.2002E-02	1.7755E-01	-1.9851E-02	-6.9730E-02	-1.7315E-03
7.419	9.5862E-02	4.4052E-01	1.7996E+00	1.3567E-02	1.0194E-01	4.0784E-02	1.6950E-01	-1.7703E-02	-6.7792E-02	-1.9276E-03
7.629	9.0161E-02	4.3123E-01	1.6645E+00	1.3197E-02	9.2463E-02	3.9696E-02	1.4987E-01	-1.5368E-02	-6.6009E-02	-2.1337E-03
7.838	8.4760E-02	4.2149E-01	1.5366E+00	1.2841E-02	8.3778E-02	3.9509E-02	1.3126E-01	-1.2775E-02	-6.4263E-02	-2.3519E-03
8.047	7.9882E-02	4.0850E-01	1.4223E+00	1.2510E-02	7.6690E-02	3.6990E-02	1.1640E-01	-1.2496E-02	-6.2496E-02	-2.2777E-03
8.257	7.5270E-02	3.9620E-01	1.3166E+00	1.2182E-02	7.0157E-02	3.5625E-02	1.0297E-01	-1.2319E-02	-6.0743E-02	-2.2332E-03
8.466	7.0098E-02	3.7837E-01	1.1644E+00	1.1852E-02	5.9430E-02	3.3160E-02	8.4763E-02	-9.4743E-03	-5.8711E-02	-2.3499E-03
8.676	6.5176E-02	3.5797E-01	1.0195E+00	1.1034E-02	4.9223E-02	3.0710E-02	6.7439E-02	-7.6041E-03	-5.5234E-02	-2.2844E-03
8.885	6.0484E-02	3.1904E-01	8.8144E-01	9.3871E-03	3.9496E-02	2.8374E-02	5.0930E-02	-5.1401E-03	-4.8295E-02	-2.4293E-03
9.095	5.6005E-02	2.7642E-01	7.4975E-01	7.5800E-03	3.0213E-02	2.6006E-02	3.5174E-02	-4.0015E-03	-4.0178E-02	-2.3180E-03
9.304	4.6820E-02	2.6774E-01	6.1528E-01	7.1760E-03	2.0761E-02	2.3783E-02	2.1715E-02	4.6012E-03	-3.8961E-02	-3.6196E-03
9.514	5.9772E-02	2.8021E-01	3.2264E-01	8.8979E-03	1.5789E-03	1.9939E-02	8.8587E-02	9.0708E-03	-4.6255E-02	-3.8542E-03

TEST 2100

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   13.2300
BEAM AT MIDSHIP=    5.1738

DISPLACED VOLUME/(L/2)**3=   .933320E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=   .127107E+01
VERTICAL CENTER OF BOYANCY/L=  -.251971E-01
METACENTER HEIGHT OVER WATE-PLANE/L=   .226645E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .246245E+02
HEAVE-PITCH RESTORING COEFFICIENT=   .953845E+00
PITCH-PITCH RESTORING COEFFICIENT=   .142504E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .530000E+00
TOTAL MASS=     .0230
(ROLL-RADIUS OF GYRATION/L)**2=   .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .604000E-01
(YAW-RADIUS OF GYRATION/L)**2=   .604000E-01
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(RAD)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.344	1.5274E-01	5.3107E-01	3.7266E+00	2.2571E-02	1.7373E-01	2.5750E-02	1.5261E-02	-2.3433E-02	-9.5740E-02	-2.5125E-03
1.554	1.3418E-01	5.3001E-01	3.3286E+00	2.2746E-02	1.5446E-01	3.6125E-02	1.4077E-02	-2.4827E-02	-9.4549E-02	-2.3240E-03
1.763	1.1597E-01	5.1610E-01	3.0357E+00	2.1871E-02	1.3594E-01	3.5876E-02	9.6663E-03	-2.6950E-02	-9.0970E-02	-1.9587E-03
1.973	1.0854E-01	4.5168E-01	2.8187E+00	2.0495E-02	1.2855E-01	3.5053E-02	5.1463E-03	-2.9315E-02	-8.5191E-02	-1.4571E-03
2.182	1.0032E-01	4.6693E-01	2.6594E+00	1.8873E-02	1.2061E-01	3.3761E-02	6.2284E-04	-3.1757E-02	-7.8278E-02	-1.0405E-03
2.392	9.3573E-02	4.2815E-01	2.5408E+00	1.7240E-02	1.1431E-01	3.2215E-02	-3.9887E-03	-3.2711E-02	-7.1224E-02	-6.5665E-04
2.601	8.8302E-02	3.9648E-01	2.4561E+00	1.5743E-02	1.0959E-01	3.0495E-02	-8.5242E-03	-3.3285E-02	-6.4674E-02	-3.6933E-04
2.811	8.4221E-02	3.6755E-01	2.3966E+00	1.4447E-02	1.0610E-01	2.9730E-02	-1.2973E-02	-3.3174E-02	-5.8933E-02	-1.7276E-04
3.020	8.1097E-02	3.4234E-01	2.3563E+00	1.3364E-02	1.0357E-01	2.7006E-02	-1.7272E-02	-3.2859E-02	-5.4077E-02	-4.8924E-05
3.229	8.5109E-02	3.2035E-01	2.4391E+00	1.2479E-02	1.0852E-01	2.5362E-02	-4.8258E-02	-3.1610E-02	-5.0069E-02	2.1471E-05
3.439	9.4883E-02	3.0140E-01	2.5562E+00	1.1766E-02	1.1333E-01	2.3051E-02	-7.4854E-02	-3.0492E-02	-4.6785E-02	5.4603E-05
3.648	9.9030E-02	2.8577E-01	2.6717E+00	1.1158E-02	1.1705E-01	2.2488E-02	-8.9569E-02	-2.9317E-02	-4.4143E-02	6.2643E-05
3.858	1.0241E-01	2.7365E-01	2.7635E+00	1.0811E-02	1.2045E-01	2.1356E-02	-9.6639E-02	-2.7914E-02	-4.2249E-02	-8.9748E-06
4.067	1.0402E-01	2.6384E-01	2.8264E+00	1.0515E-02	1.2301E-01	2.0345E-02	-1.0059E-01	-2.6621E-02	-4.0766E-02	-7.4519E-05
4.277	1.0529E-01	2.5656E-01	2.8663E+00	1.0353E-02	1.2487E-01	1.9460E-02	-1.0247E-01	-2.5514E-02	-3.9779E-02	-1.2582E-04
4.486	1.0684E-01	2.5063E-01	2.8851E+00	1.0205E-02	1.2608E-01	1.8694E-02	-1.0382E-01	-2.4644E-02	-3.8935E-02	-1.5267E-04
4.696	1.0773E-01	2.4609E-01	2.9104E+00	1.0087E-02	1.2685E-01	1.8062E-02	-1.0613E-01	-2.4070E-02	-3.8287E-02	-1.3810E-04
4.905	1.0815E-01	2.4059E-01	2.9529E+00	9.9604E-03	1.2730E-01	1.7469E-02	-1.0775E-01	-2.3759E-02	-3.7219E-02	-3.2161E-05
5.115	1.0819E-01	2.3799E-01	2.9876E+00	9.8239E-03	1.2744E-01	1.7041E-02	-1.0778E-01	-2.3303E-02	-3.6850E-02	-5.7693E-05
5.324	1.0788E-01	2.3381E-01	3.0044E+00	9.7392E-03	1.2713E-01	1.6686E-02	-1.0790E-01	-2.3077E-02	-3.6322E-02	-8.1151E-05
5.534	1.0729E-01	2.3165E-01	3.0059E+00	9.7124E-03	1.2650E-01	1.6393E-02	-1.0771E-01	-2.2637E-02	-3.6173E-02	-1.4585E-04
5.743	1.0652E-01	2.2937E-01	3.0249E+00	9.6429E-03	1.2689E-01	1.6146E-02	-1.1114E-01	-2.2378E-02	-3.5835E-02	-1.8326E-04
5.953	1.0566E-01	2.2624E-01	3.0379E+00	9.4286E-03	1.2723E-01	1.5871E-02	-1.1279E-01	-2.2305E-02	-3.4852E-02	-4.4895E-05
6.162	1.0469E-01	2.1945E-01	3.0366E+00	9.2543E-03	1.2734E-01	1.5509E-02	-1.1363E-01	-2.2926E-02	-3.3410E-02	-4.6046E-05
6.372	1.0363E-01	2.1822E-01	3.0320E+00	9.2826E-03	1.2736E-01	1.5411E-02	-1.1360E-01	-2.2448E-02	-3.4148E-02	-2.5845E-04
6.581	1.0250E-01	2.1658E-01	3.0229E+00	9.2832E-03	1.2714E-01	1.5312E-02	-1.1327E-01	-2.1984E-02	-3.4075E-02	-3.6956E-04
6.791	1.0178E-01	2.1613E-01	3.0192E+00	9.2903E-03	1.2685E-01	1.5257E-02	-1.1274E-01	-2.1748E-02	-3.4049E-02	-4.4802E-04
7.000	1.0099E-01	2.1496E-01	2.9987E+00	9.2781E-03	1.2659E-01	1.5183E-02	-1.1262E-01	-2.1530E-02	-3.3951E-02	-5.1157E-04
7.210	1.0013E-01	2.1409E-01	2.9836E+00	9.2563E-03	1.2617E-01	1.5157E-02	-1.1229E-01	-2.1298E-02	-3.3852E-02	-5.7330E-04
7.419	9.9202E-02	2.1268E-01	2.9655E+00	9.2210E-03	1.2563E-01	1.5103E-02	-1.1172E-01	-2.1111E-02	-3.3698E-02	-6.2340E-04
7.628	9.8381E-02	2.1150E-01	2.9537E+00	9.1755E-03	1.2572E-01	1.5039E-02	-1.0848E-01	-2.0922E-02	-3.3510E-02	-6.6721E-04
7.838	9.7507E-02	2.1019E-01	2.9399E+00	9.1225E-03	1.2563E-01	1.4997E-02	-1.0542E-01	-2.0811E-02	-3.3305E-02	-7.0116E-04
8.047	9.6558E-02	2.0917E-01	2.9215E+00	9.0789E-03	1.2529E-01	1.4962E-02	-1.0264E-01	-2.0657E-02	-3.3162E-02	-7.3990E-04
8.257	9.5571E-02	2.0795E-01	2.9011E+00	9.0231E-03	1.2477E-01	1.4907E-02	-1.0024E-01	-2.0485E-02	-3.2977E-02	-7.7701E-04
8.466	9.4587E-02	2.0510E-01	2.8807E+00	8.9590E-03	1.2430E-01	1.4688E-02	-9.7844E-02	-1.9958E-02	-3.2729E-02	-8.2695E-04
8.676	9.3587E-02	2.0440E-01	2.8583E+00	8.9114E-03	1.2372E-01	1.4485E-02	-9.5554E-02	-1.9370E-02	-3.2629E-02	-8.8976E-04
8.885	9.2575E-02	2.0361E-01	2.8359E+00	8.9193E-03	1.2307E-01	1.4282E-02	-9.3362E-02	-1.8908E-02	-3.2710E-02	-9.2462E-04
9.495	9.1558E-02	2.0140E-01	2.8120E+00	8.8343E-03	1.2235E-01	1.4074E-02	-9.1281E-02	-1.8526E-02	-3.2417E-02	-9.4367E-04
9.304	9.0831E-02	1.9755E-01	2.7877E+00	8.6622E-03	1.2161E-01	1.3919E-02	-8.9360E-02	-1.8269E-02	-3.1682E-02	-9.7052E-04
9.514	1.0809E-01	2.0137E-01	2.8424E+00	8.8566E-03	1.2454E-01	1.3820E-02	-8.7191E-02	-1.7600E-02	-3.2692E-02	-1.0754E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(RD)	F(1,1)	F(2,2)	F(3,3)	F(4,4)	F(5,5)	F(6,6)	F(3,5)	F(2,6)	F(2,4)	F(4,6)
1.344	2.6466E-01	1.0120E-01	5.8920E+00	5.1190E-03	2.7551E-01	4.8886E-03	3.6419E-02	4.7874E-03	-2.1910E-02	-1.3440E-03
1.554	2.7585E-01	1.7583E-01	6.0576E+00	8.7674E-03	2.8634E-01	8.7398E-03	5.1747E-02	7.5073E-03	-3.7677E-02	-2.2100E-03
1.763	2.8489E-01	2.6595E-01	6.1346E+00	1.3022E-02	2.9754E-01	1.3710E-02	6.7750E-02	9.5753E-03	-5.6231E-02	-3.1081E-03
1.973	2.8940E-01	3.5991E-01	6.1321E+00	1.7251E-02	2.9495E-01	1.9389E-02	8.4223E-02	9.8920E-03	-7.4901E-02	-3.8031E-03
2.182	2.9391E-01	4.4742E-01	6.0555E+00	2.0929E-02	2.9424E-01	2.5312E-02	1.0097E-01	7.9379E-03	-9.1414E-02	-4.1842E-03
2.392	2.8983E-01	5.2219E-01	5.9474E+00	2.3756E-02	2.9059E-01	3.1095E-02	1.1779E-01	3.9219E-03	-1.0458E-01	-4.2513E-03
2.601	2.8649E-01	5.8203E-01	5.7880E+00	2.5822E-02	2.8564E-01	3.6462E-02	1.3449E-01	-1.5036E-03	-1.1419E-01	-4.0750E-03
2.811	2.8119E-01	6.2728E-01	5.5558E+00	2.7103E-02	2.7860E-01	4.1232E-02	1.5093E-01	-7.5958E-03	-1.2056E-01	-3.7394E-03
3.020	2.7414E-01	6.5946E-01	5.3775E+00	2.7777E-02	2.7017E-01	4.5298E-02	1.6704E-01	-1.3738E-02	-1.2425E-01	-3.3125E-03
3.229	2.5901E-01	6.8344E-01	5.1151E+00	2.7976E-02	2.5981E-01	4.8620E-02	1.8719E-01	-1.9511E-02	-1.2579E-01	-2.8391E-03
3.439	2.4510E-01	6.9202E-01	4.8329E+00	2.7811E-02	2.4912E-01	5.1201E-02	2.0314E-01	-2.4682E-02	-1.2565E-01	-2.3438E-03
3.648	2.3220E-01	6.9579E-01	4.5647E+00	2.7366E-02	2.3883E-01	5.3478E-02	2.1351E-01	-2.9179E-02	-1.2417E-01	-1.8357E-03
3.858	2.2019E-01	6.9015E-01	4.3215E+00	2.6513E-02	2.2967E-01	5.4065E-02	2.2227E-01	-3.3871E-02	-1.2112E-01	-1.1652E-03
4.067	2.0893E-01	6.7860E-01	4.0598E+00	2.5643E-02	2.1974E-01	5.4547E-02	2.2864E-01	-3.7768E-02	-1.1703E-01	-4.8865E-04
4.277	1.9831E-01	6.6181E-01	3.8976E+00	2.4463E-02	2.1092E-01	5.4632E-02	2.3374E-01	-4.0768E-02	-1.1203E-01	9.9468E-05
4.486	1.8830E-01	6.4158E-01	3.7131E+00	2.3152E-02	2.0265E-01	5.4340E-02	2.3794E-01	-4.2956E-02	-1.0649E-01	6.1330E-04
4.696	1.7912E-01	6.1724E-01	3.5455E+00	2.1651E-02	1.9493E-01	5.3625E-02	2.4110E-01	-4.4786E-02	-1.0015E-01	1.1570E-03
4.905	1.7066E-01	5.6920E-01	3.3963E+00	1.9198E-02	1.8768E-01	5.1658E-02	2.4345E-01	-5.1066E-02	-8.7957E-02	2.9441E-03
5.115	1.6285E-01	5.3756E-01	3.2610E+00	1.7447E-02	1.8090E-01	5.0646E-02	2.4552E-01	-5.2080E-02	-8.0391E-02	3.4204E-03
5.324	1.5563E-01	5.5551E-01	3.1340E+00	1.8581E-02	1.7455E-01	5.0212E-02	2.4703E-01	-4.6748E-02	-8.5953E-02	2.3233E-03
5.534	1.4876E-01	5.3113E-01	2.9903E+00	1.7307E-02	1.6772E-01	4.9122E-02	2.4346E-01	-4.6131E-02	-8.0420E-02	2.5210E-03
5.743	1.4216E-01	5.1267E-01	2.8312E+00	1.6403E-02	1.5580E-01	4.9020E-02	2.3804E-01	-4.4725E-02	-7.6497E-02	2.5481E-03
5.953	1.3586E-01	4.6859E-01	2.6744E+00	1.4529E-02	1.5168E-01	4.4615E-02	2.3042E-01	-5.0028E-02	-6.6521E-02	4.0497E-03
6.162	1.2991E-01	4.5463E-01	2.5243E+00	1.3216E-02	1.4365E-01	4.6941E-02	2.2194E-01	-3.9907E-02	-6.3416E-02	1.7428E-03
6.372	1.2425E-01	4.9434E-01	2.3801E+00	1.6011E-02	1.3589E-01	4.6465E-02	2.1257E-01	-3.0964E-02	-7.9137E-02	-7.2354E-04
6.581	1.1893E-01	4.7926E-01	2.2450E+00	1.5251E-02	1.2802E-01	4.5111E-02	2.0374E-01	-2.8520E-02	-7.5740E-02	-9.5360E-04
6.791	1.1266E-01	4.6550E-01	2.1174E+00	1.4769E-02	1.2081E-01	4.3561E-02	1.9663E-01	-2.6971E-02	-7.3323E-02	-1.1113E-03
7.000	1.0672E-01	4.6474E-01	2.0049E+00	1.4405E-02	1.1396E-01	4.3595E-02	1.8657E-01	-2.1132E-02	-7.2002E-02	-1.5951E-03
7.210	1.0110E-01	4.5102E-01	1.8587E+00	1.3965E-02	1.0746E-01	4.2002E-02	1.7755E-01	-1.9851E-02	-6.9738E-02	-1.7315E-03
7.419	9.5862E-02	4.4052E-01	1.7996E+00	1.3567E-02	1.0154E-01	4.0784E-02	1.6550E-01	-1.7703E-02	-6.7752E-02	-1.9276E-03
7.629	9.0161E-02	4.3123E-01	1.6645E+00	1.3197E-02	9.2403E-02	3.9896E-02	1.4987E-01	-1.5368E-02	-6.6009E-02	-2.1377E-03
7.838	8.4760E-02	4.2149E-01	1.5366E+00	1.2841E-02	8.3738E-02	3.9569E-02	1.3126E-01	-1.2775E-02	-6.4263E-02	-2.3519E-03
8.047	7.9882E-02	4.0850E-01	1.4223E+00	1.2510E-02	7.6690E-02	3.6598E-02	1.1640E-01	-1.2496E-02	-6.2496E-02	-2.2777E-03
8.257	7.5270E-02	3.9620E-01	1.3166E+00	1.2182E-02	7.0187E-02	3.5625E-02	1.0297E-01	-1.2319E-02	-6.0743E-02	-2.2332E-03
8.466	7.0985E-02	3.7837E-01	1.1644E+00	1.1852E-02	5.9430E-02	3.3160E-02	8.4763E-02	-9.4743E-03	-5.8711E-02	-2.3499E-03
8.676	6.5176E-02	3.5797E-01	1.0195E+00	1.1034E-02	4.5273E-02	3.0710E-02	5.7439E-02	-7.6041E-03	-5.5234E-02	-2.2844E-03
8.885	6.0484E-02	3.1904E-01	8.8144E-01	9.3871E-03	3.9456E-02	2.8374E-02	5.0930E-02	-5.1401E-03	-4.8295E-02	-2.4293E-03
9.095	5.6905E-02	2.7642E-01	7.4575E-01	7.5800E-03	3.0213E-02	2.5006E-02	3.5174E-02	-4.0015E-03	-4.0178E-02	-2.3180E-03
9.304	4.6820E-02	2.6774E-01	6.1528E-01	7.1760E-03	2.0761E-02	2.3783E-02	2.1775E-02	4.6012E-03	-3.8561E-02	-3.6196E-03
9.514	5.9772E-02	2.8021E-01	3.2264E-01	6.8579E-03	1.5789E-03	1.9939E-02	8.8563E-02	9.0708E-03	-4.6295E-02	-3.8542E-03

TEST 2200

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   14.1700
BEAM AT MIDSHIP=    5.0218

DISPLACED VOLUME/(L/2)**3=    .670557E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .960872E+00
VERTICAL CENTER OF BOYANCY/L=  -.226732E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .239914E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .328765E+02
HEAVE-PITCH RESTORING COEFFICIENT=  -.149707E+01
PITCH-PITCH RESTORING COEFFICIENT=    .285937E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .470000E+00
TOTAL MASS=      .0207
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .079000E-01
(YAW-RADIUS OF GYRATION/L)**2=    .079000E-01
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.391	5.4959E-02	6.1335E-01	4.6162E+00	2.2138E-02	2.6226E-01	3.2387E-02	-2.7787E-01	-5.2174E-02	-9.3650E-02	-1.3509E-03
1.602	4.9180E-02	6.1262E-01	4.1375E+00	2.2141E-02	2.3492E-01	3.2589E-02	-2.5314E-01	-5.2401E-02	-9.3526E-02	-1.3513E-03
1.813	4.4721E-02	6.3091E-01	3.7777E+00	2.1648E-02	2.1403E-01	3.2360E-02	-2.3442E-01	-5.1759E-02	-9.1207E-02	-1.3044E-03
2.024	4.1242E-02	5.7955E-01	3.5045E+00	2.0715E-02	1.9785E-01	3.1666E-02	-2.2003E-01	-5.0254E-02	-8.6966E-02	-1.4483E-03
2.235	3.8509E-02	5.5205E-01	3.2958E+00	1.9498E-02	1.8523E-01	3.0655E-02	-2.0883E-01	-4.8119E-02	-8.1514E-02	-1.5291E-03
2.446	3.6352E-02	5.2238E-01	3.1360E+00	1.8170E-02	1.7533E-01	2.9411E-02	-2.0062E-01	-4.5683E-02	-7.5628E-02	-1.6092E-03
2.657	3.4649E-02	4.9358E-01	3.0139E+00	1.6863E-02	1.6753E-01	2.8094E-02	-1.9384E-01	-4.3236E-02	-6.9504E-02	-1.6760E-03
2.868	3.3306E-02	4.6745E-01	2.9212E+00	1.5657E-02	1.6140E-01	2.6809E-02	-1.8745E-01	-4.0970E-02	-6.4687E-02	-1.7244E-03
3.079	3.2251E-02	4.4477E-01	2.8513E+00	1.4588E-02	1.5659E-01	2.5622E-02	-1.8294E-01	-3.8979E-02	-6.0124E-02	-1.7545E-03
3.290	3.1428E-02	4.2563E-01	2.7992E+00	1.3663E-02	1.5282E-01	2.4563E-02	-1.7924E-01	-3.7289E-02	-5.6236E-02	-1.7696E-03
3.501	3.0793E-02	4.0979E-01	2.7606E+00	1.2875E-02	1.4990E-01	2.3640E-02	-1.7615E-01	-3.5888E-02	-5.2978E-02	-1.7733E-03
3.712	3.0420E-02	3.9687E-01	2.7939E+00	1.2209E-02	1.4809E-01	2.2849E-02	-1.7155E-01	-3.4746E-02	-5.0278E-02	-1.7698E-03
3.923	3.0190E-02	3.8648E-01	2.8281E+00	1.1651E-02	1.4682E-01	2.2182E-02	-1.6962E-01	-3.3831E-02	-4.8061E-02	-1.7593E-03
4.134	3.0245E-02	3.7825E-01	2.8744E+00	1.1186E-02	1.4682E-01	2.1626E-02	-1.7010E-01	-3.3112E-02	-4.6256E-02	-1.7461E-03
4.345	3.0386E-02	3.7188E-01	2.9163E+00	1.0800E-02	1.4765E-01	2.1169E-02	-1.7414E-01	-3.2564E-02	-4.4804E-02	-1.7304E-03
4.556	3.0595E-02	3.6785E-01	2.9509E+00	1.0517E-02	1.4912E-01	2.0800E-02	-1.7986E-01	-3.2174E-02	-4.3794E-02	-1.7117E-03
4.767	3.0757E-02	3.6570E-01	2.9752E+00	1.0325E-02	1.5077E-01	2.0518E-02	-1.8636E-01	-3.1844E-02	-4.3151E-02	-1.7063E-03
4.977	3.0850E-02	3.6412E-01	2.9858E+00	1.0175E-02	1.5179E-01	2.0308E-02	-1.9131E-01	-3.1563E-02	-4.2659E-02	-1.7145E-03
5.188	3.0985E-02	3.6242E-01	2.9945E+00	1.0029E-02	1.5384E-01	2.0142E-02	-1.9846E-01	-3.1357E-02	-4.2170E-02	-1.7193E-03
5.399	3.1139E-02	3.6047E-01	3.0208E+00	9.8868E-03	1.5643E-01	2.0004E-02	-2.0508E-01	-3.1125E-02	-4.1675E-02	-1.7277E-03
5.610	3.1238E-02	3.5840E-01	3.0367E+00	9.7528E-03	1.5849E-01	1.9504E-02	-2.1013E-01	-3.0835E-02	-4.1204E-02	-1.7480E-03
5.821	3.1336E-02	3.5563E-01	3.0454E+00	9.6208E-03	1.6816E-01	1.9763E-02	-2.1287E-01	-3.0407E-02	-4.0705E-02	-1.7748E-03
6.032	3.1376E-02	3.5420E-01	3.0470E+00	9.5591E-03	1.6131E-01	1.9635E-02	-2.1433E-01	-2.9920E-02	-4.0484E-02	-1.8103E-03
6.243	3.1491E-02	3.5187E-01	3.0441E+00	9.4281E-03	1.6222E-01	1.9452E-02	-2.1426E-01	-2.9686E-02	-4.0099E-02	-1.7994E-03
6.454	3.1565E-02	3.4994E-01	3.0379E+00	9.3002E-03	1.6257E-01	1.9307E-02	-2.1454E-01	-2.9436E-02	-3.9597E-02	-1.7729E-03
6.665	3.1604E-02	3.4839E-01	3.0268E+00	9.1766E-03	1.6336E-01	1.9197E-02	-2.1420E-01	-2.9227E-02	-3.9142E-02	-1.7533E-03
6.876	3.1653E-02	3.4656E-01	3.0084E+00	9.0528E-03	1.6346E-01	1.9052E-02	-2.1353E-01	-2.9306E-02	-3.8620E-02	-1.6928E-03
7.087	3.1551E-02	3.4589E-01	2.9869E+00	8.9412E-03	1.6313E-01	1.9027E-02	-2.1239E-01	-2.9472E-02	-3.8249E-02	-1.6446E-03
7.298	3.1588E-02	3.4483E-01	2.9670E+00	8.8434E-03	1.6282E-01	1.8989E-02	-2.1084E-01	-2.9483E-02	-3.7903E-02	-1.6204E-03
7.509	3.1777E-02	3.4447E-01	2.9718E+00	8.7462E-03	1.6426E-01	1.9050E-02	-2.1603E-01	-2.9812E-02	-3.7588E-02	-1.5798E-03
7.720	3.1770E-02	3.4359E-01	2.9590E+00	8.6584E-03	1.6486E-01	1.9083E-02	-2.2322E-01	-3.0109E-02	-3.7302E-02	-1.5346E-03
7.931	3.1749E-02	3.4315E-01	2.9436E+00	8.5792E-03	1.6481E-01	1.9047E-02	-2.2926E-01	-3.0268E-02	-3.7029E-02	-1.4958E-03
8.142	3.1680E-02	3.4020E-01	2.9309E+00	8.3718E-03	1.6507E-01	1.9026E-02	-2.3304E-01	-3.0120E-02	-3.6253E-02	-1.5137E-03
8.353	3.1578E-02	3.4007E-01	2.9157E+00	8.3316E-03	1.6510E-01	1.8598E-02	-2.3614E-01	-3.0390E-02	-3.6184E-02	-1.4539E-03
8.564	3.1447E-02	3.3588E-01	2.8985E+00	8.1535E-03	1.6452E-01	1.8744E-02	-2.3866E-01	-2.9664E-02	-3.5470E-02	-1.5475E-03
8.775	3.1065E-02	3.3273E-01	2.8747E+00	8.1075E-03	1.6405E-01	1.8532E-02	-2.4223E-01	-2.9147E-02	-3.4960E-02	-1.6808E-03
8.986	3.0684E-02	3.3270E-01	2.8500E+00	8.0911E-03	1.6308E-01	1.8480E-02	-2.4521E-01	-2.9307E-02	-3.4986E-02	-1.5515E-03
9.197	3.0304E-02	3.3085E-01	2.8245E+00	8.0155E-03	1.6283E-01	1.8380E-02	-2.4766E-01	-2.9158E-02	-3.4676E-02	-1.5613E-03
9.408	2.9931E-02	3.2793E-01	2.7985E+00	7.8583E-03	1.6091E-01	1.8265E-02	-2.4966E-01	-2.8810E-02	-3.4149E-02	-1.6111E-03
9.619	2.9596E-02	3.2851E-01	2.7379E+00	8.2204E-03	1.6219E-01	1.8367E-02	-2.5713E-01	-2.6556E-02	-3.5571E-02	-2.3127E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.391	8.5427E-02	9.3449E-02	7.4985E+00	4.2979E-03	4.1573E-01	3.6433E-03	-3.8808E-01	-6.7174E-03	-1.8845E-02	1.4262E-04
1.602	8.9850E-02	1.6043E-01	7.7747E+00	7.3956E-03	4.3522E-01	6.4449E-03	-4.0395E-01	-1.1901E-02	-3.2346E-02	2.7559E-04
1.813	9.3024E-02	2.4174E-01	7.9495E+00	1.1175E-02	4.4875E-01	1.0066E-02	-4.1447E-01	-1.8508E-02	-4.8724E-02	4.4408E-04
2.024	9.5151E-02	3.2736E-01	8.0364E+00	1.5196E-02	4.5745E-01	1.4179E-02	-4.2072E-01	-2.5781E-02	-6.5985E-02	6.0978E-04
2.235	9.6420E-02	4.0732E-01	8.0525E+00	1.9017E-02	4.6221E-01	1.8360E-02	-4.2350E-01	-3.2829E-02	-8.2168E-02	7.3234E-04
2.446	9.6981E-02	4.7490E-01	8.0113E+00	2.2344E-02	4.6372E-01	2.2240E-02	-4.2346E-01	-3.8958E-02	-9.5986E-02	7.8910E-04
2.657	9.6958E-02	5.2773E-01	7.9239E+00	2.5054E-02	4.6258E-01	2.5586E-02	-4.2105E-01	-4.3827E-02	-1.0694E-01	7.8022E-04
2.868	9.6457E-02	5.6588E-01	7.7992E+00	2.7150E-02	4.5925E-01	2.8306E-02	-4.1667E-01	-4.7390E-02	-1.1509E-01	7.2033E-04
3.079	9.5567E-02	5.9127E-01	7.6448E+00	2.8696E-02	4.5413E-01	3.0464E-02	-4.1060E-01	-4.9783E-02	-1.2078E-01	6.2832E-04
3.290	9.4363E-02	6.0621E-01	7.4662E+00	2.9779E-02	4.4755E-01	3.1937E-02	-4.0304E-01	-5.1203E-02	-1.2444E-01	5.2085E-04
3.501	9.2910E-02	6.1288E-01	7.2678E+00	3.0486E-02	4.3979E-01	3.2982E-02	-3.9414E-01	-5.1853E-02	-1.2648E-01	4.1006E-04
3.712	9.1221E-02	6.1319E-01	7.0385E+00	3.0889E-02	4.3082E-[illegible]	3.3617E-02	-3.8516E-01	-5.1907E-02	-1.2725E-01	3.0364E-04
3.923	8.9428E-02	6.0866E-01	6.8158E+00	3.1058E-02	4.2126E-01	3.3916E-02	-3.7422E-01	-5.1507E-02	-1.2705E-01	2.0596E-04
4.134	8.7297E-02	6.0050E-01	6.5758E+00	3.1017E-02	4.0573E-01	3.3943E-02	-3.6137E-01	-5.0767E-02	-1.2609E-01	1.1923E-04
4.345	8.5197E-02	5.8970E-01	6.3471E+00	3.0831E-02	3.9798E-01	3.3753E-02	-3.4627E-01	-4.9780E-02	-1.2456E-01	4.4569E-05
4.556	8.2768E-02	5.7479E-01	6.1301E+00	3.0355E-02	3.8602E-01	3.3394E-02	-3.3474E-01	-4.8612E-02	-1.2199E-01	-2.0575E-05
4.767	8.0435E-02	5.5453E-01	5.9223E+00	2.9486E-02	3.7360E-01	3.2862E-02	-3.2057E-01	-4.7272E-02	-1.1797E-01	-7.1245E-05
4.977	7.8257E-02	5.3314E-01	5.7298E+00	2.8546E-02	3.6179E-01	3.2196E-02	-3.0667E-01	-4.5722E-02	-1.1371E-01	-1.3135E-04
5.188	7.5516E-02	5.1122E-01	5.5434E+00	2.7614E-02	3.4936E-01	3.1407E-02	-2.9398E-01	-4.3867E-02	-1.0942E-01	-2.2080E-04
5.399	7.2803E-02	4.8819E-01	5.2102E+00	2.6601E-02	3.3679E-01	3.0427E-02	-2.8233E-01	-4.1858E-02	-1.0490E-01	-2.5087E-04
5.610	7.0037E-02	4.6614E-01	4.8243E+00	2.5619E-02	3.2380E-01	2.9413E-02	-2.6369E-01	-4.0117E-02	-1.0055E-01	-2.9740E-04
5.821	6.7359E-02	4.4368E-01	4.4421E+00	2.4682E-02	3.1113E-01	2.8227E-02	-2.5019E-01	-3.7650E-02	-9.6296E-02	-3.6044E-04
6.032	6.4835E-02	4.2099E-01	4.0057E+00	2.3652E-02	2.9927E-01	2.7066E-02	-2.3792E-01	-3.5715E-02	-9.1822E-02	-4.0318E-04
6.243	6.2458E-02	3.9650E-01	3.7431E+00	2.2357E-02	2.8774E-01	2.5856E-02	-2.2870E-01	-3.4075E-02	-8.6643E-02	-3.3005E-04
6.454	5.9935E-02	3.7058E-01	3.3983E+00	2.0609E-02	2.7470E-01	2.4637E-02	-2.1896E-01	-3.2629E-02	-8.0669E-02	-1.7305E-04
6.665	5.7548E-02	3.4470E-01	3.0748E+00	1.8882E-02	2.6243E-01	2.3417E-02	-2.1081E-01	-3.1099E-02	-7.4733E-02	-7.5574E-05
6.876	5.4994E-02	3.1891E-01	2.7851E+00	1.7260E-02	2.5076E-01	2.2120E-02	-2.0096E-01	-2.8824E-02	-6.8871E-02	-7.1960E-05
7.087	5.2001E-02	2.9455E-01	2.4767E+00	1.5678E-02	2.3797E-01	2.0874E-02	-1.8848E-01	-2.6989E-02	-6.3378E-02	-4.2227E-05
7.298	4.9431E-02	2.6974E-01	2.1966E+00	1.4137E-02	2.2638E-01	1.9551E-02	-1.7463E-01	-2.4681E-02	-5.7891E-02	-9.4559E-05
7.509	4.6797E-02	2.4719E-01	1.9103E+00	1.2681E-02	2.1383E-01	1.8393E-02	-1.5682E-01	-2.2798E-02	-5.2791E-02	-1.1503E-04
7.720	4.4143E-02	2.3125E-01	1.6303E+00	1.1648E-02	2.0142E-01	1.7338E-02	-1.4066E-01	-2.1621E-02	-4.9399E-02	4.5077E-05
7.931	4.1594E-02	2.0731E-01	1.3649E+00	1.0154E-02	1.8963E-01	1.6121E-02	-1.2624E-01	-1.9582E-02	-4.4106E-02	-3.5659E-07
8.142	3.8166E-02	1.5970E-01	1.0706E+00	7.1785E-03	1.7488E-01	1.4979E-02	-1.2484E-01	-1.5209E-02	-3.2784E-02	-6.2624E-04
8.353	3.4911E-02	2.0504E-01	7.9121E-01	1.0374E-02	1.6088E-01	1.3934E-02	-1.2351E-01	-1.7388E-02	-4.5744E-02	4.7893E-04
8.564	3.1816E-02	1.4930E-01	5.2555E-01	8.0039E-03	1.4757E-01	1.1787E-02	-1.2225E-01	-8.9150E-03	-3.4628E-02	-9.1594E-04
8.775	2.9736E-02	2.2197E-01	2.9045E-01	1.0338E-02	1.3684E-01	1.3837E-02	-1.1518E-01	-2.3507E-02	-4.7532E-02	1.9989E-03
8.986	2.7753E-02	1.9130E-01	6.6381E-02	8.7046E-03	1.2661E-01	1.2538E-02	-1.0846E-01	-1.9374E-02	-4.1262E-02	1.3948E-03
9.197	2.5861E-02	1.6816E-01	-1.4740E-01	7.4409E-03	1.1685E-01	1.1465E-02	-1.0200E-01	-1.6455E-02	-3.6316E-02	1.0154E-03
9.408	2.3973E-02	1.4189E-01	-3.5335E-01	6.0584E-03	1.0709E-01	1.0261E-02	-9.4972E-02	-1.2785E-02	-3.0786E-02	4.9447E-04
9.619	2.3394E-02	1.5047E-01	1.4445E+00	9.5435E-03	1.0266E-01	9.5712E-03	-1.3745E-01	-8.3570E-03	-3.6198E-02	-3.5878E-04

TEST 2300

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    9.2600
BEAM AT MIDSHIP=    3.8750

DISPLACED VOLUME/(L/2)**3=   .101176E+00
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .141051E+01
VERTICAL CENTER OF BOYANCY/L=  -.254810E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .266790E+00
HEAVE-HEAVE RESTORING COEFFICIENT=   .250578E+02
HEAVE-PITCH RESTORING COEFFICIENT=   .280050E+01
PITCH-PITCH RESTORING COEFFICIENT=   .180752E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .220000E+00
TOTAL MASS=      .0087
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .104700E+00
(YAW-RADIUS OF GYRATION/L)**2=    .104700E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.265	9.5488E-02	4.2772E-01	4.3351E+00	2.6352E-02	2.6537E-01	1.5717E-02	3.8989E-01	2.7111E-02	-8.7567E-02	5.0968E-04
1.465	8.4159E-02	4.2776E-01	3.8829E+00	2.6137E-02	2.3789E-01	1.5746E-02	3.5043E-01	2.6689E-02	-8.7065E-02	6.9441E-04
1.665	7.5743E-02	4.1145E-01	3.5522E+00	2.5337E-02	2.1718E-01	1.5238E-02	3.1924E-01	2.4474E-02	-8.3386E-02	1.0732E-03
1.865	6.9463E-02	3.9102E-01	3.3099E+00	2.3897E-02	2.0142E-01	1.4262E-02	2.9399E-01	2.0853E-02	-7.7065E-02	1.5631E-03
2.065	6.4802E-02	3.4260E-01	3.1337E+00	2.2150E-02	1.8937E-01	1.3018E-02	2.7311E-01	1.6637E-02	-6.9345E-02	2.0442E-03
2.265	6.1400E-02	3.0249E-01	3.0077E+00	2.0368E-02	1.8017E-01	1.1709E-02	2.5556E-01	1.2558E-02	-6.1448E-02	2.4304E-03
2.465	5.8790E-02	2.6493E-01	2.9203E+00	1.8727E-02	1.7316E-01	1.0472E-02	2.4059E-01	9.0252E-03	-5.4176E-02	2.6914E-03
2.665	5.7367E-02	2.3189E-01	2.8625E+00	1.7309E-02	1.6786E-01	9.3711E-03	2.2773E-01	6.1590E-03	-4.7890E-02	2.8363E-03
2.865	5.7718E-02	2.0385E-01	2.8565E+00	1.6133E-02	1.6565E-01	8.4241E-03	2.0951E-01	3.9233E-03	-4.2661E-02	2.8896E-03
3.065	5.8657E-02	1.8055E-01	2.9209E+00	1.5181E-02	1.6573E-01	7.6248E-03	1.8450E-01	2.2223E-03	-3.8413E-02	2.8777E-03
3.265	6.1606E-02	1.6142E-01	3.0437E+00	1.4421E-02	1.6692E-01	6.9579E-03	1.5907E-01	9.5360E-04	-3.5012E-02	2.8225E-03
3.465	6.7658E-02	1.4731E-01	3.1947E+00	1.3961E-02	1.6771E-01	6.4755E-03	1.4091E-01	3.4571E-04	-3.2771E-02	2.6419E-03
3.665	7.0720E-02	1.3665E-01	3.3288E+00	1.3725E-02	1.6836E-01	6.0759E-03	1.3055E-01	-4.8229E-06	-3.1360E-02	2.4341E-03
3.865	7.3085E-02	1.2775E-01	3.4566E+00	1.3647E-02	1.6961E-01	5.7305E-03	1.2895E-01	-3.0071E-04	-3.0435E-02	2.2686E-03
4.065	7.4785E-02	1.2110E-01	3.5585E+00	1.3654E-02	1.7105E-01	5.4516E-03	1.3119E-01	-4.6192E-04	-2.9889E-02	2.0955E-03
4.265	7.5873E-02	1.1528E-01	3.6292E+00	1.3679E-02	1.7190E-01	5.2079E-03	1.3349E-01	-6.4197E-04	-2.9483E-02	1.9682E-03
4.466	7.6594E-02	1.1008E-01	3.6848E+00	1.3661E-02	1.7316E-01	4.9919E-03	1.3861E-01	-8.1078E-04	-2.9063E-02	1.8640E-03
4.666	7.7040E-02	1.0553E-01	3.7302E+00	1.3639E-02	1.7525E-01	4.8079E-03	1.4692E-01	-1.0020E-03	-2.8696E-02	1.7938E-03
4.866	7.7165E-02	1.0286E-01	3.7568E+00	1.3669E-02	1.7663E-01	4.7343E-03	1.5386E-01	-8.9038E-04	-2.8568E-02	1.7037E-03
5.066	7.7098E-02	1.0040E-01	3.7741E+00	1.3673E-02	1.7837E-01	4.6741E-03	1.6197E-01	-8.3838E-04	-2.8408E-02	1.6393E-03
5.266	7.7197E-02	9.7856E-02	3.7859E+00	1.3597E-02	1.7991E-01	4.6082E-03	1.6687E-01	-7.7268E-04	-2.8065E-02	1.5610E-03
5.466	7.7116E-02	9.5995E-02	3.7900E+00	1.3630E-02	1.8163E-01	4.5590E-03	1.7254E-01	-8.1798E-04	-2.8050E-02	1.5508E-03
5.666	7.6856E-02	9.3389E-02	3.7844E+00	1.3453E-02	1.8274E-01	4.5010E-03	1.7715E-01	-1.0084E-03	-2.7564E-02	1.6122E-03
5.866	7.6470E-02	9.3389E-02	3.7734E+00	1.3537E-02	1.8366E-01	4.5080E-03	1.8166E-01	-7.7542E-04	-2.7800E-02	1.5521E-03
6.066	7.5997E-02	9.3467E-02	3.7589E+00	1.3607E-02	1.8430E-01	4.5629E-03	1.8606E-01	-6.9917E-04	-2.8032E-02	1.5356E-03
6.266	7.5482E-02	9.3349E-02	3.7455E+00	1.3641E-02	1.8452E-01	4.6029E-03	1.8963E-01	-6.3288E-04	-2.8178E-02	1.5184E-03
6.466	7.5041E-02	9.3070E-02	3.7431E+00	1.3645E-02	1.8506E-01	4.6302E-03	1.9116E-01	-5.7524E-04	-2.8254E-02	1.5008E-03
6.666	7.5683E-02	9.2716E-02	3.7430E+00	1.3635E-02	1.8618E-01	4.6536E-03	1.9114E-01	-5.4341E-04	-2.8297E-02	1.4905E-03
6.866	7.6125E-02	9.2650E-02	3.7367E+00	1.3647E-02	1.8686E-01	4.6675E-03	1.9082E-01	-5.2513E-04	-2.8407E-02	1.4823E-03
7.066	7.6397E-02	9.3309E-02	3.7251E+00	1.3665E-02	1.8719E-01	4.6806E-03	1.9025E-01	-4.2689E-04	-2.8579E-02	1.4615E-03
7.266	7.6574E-02	9.3399E-02	3.7091E+00	1.3650E-02	1.8720E-01	4.6819E-03	1.8946E-01	-3.0155E-04	-2.8615E-02	1.4330E-03
7.466	7.6551E-02	9.3822E-02	3.6915E+00	1.3626E-02	1.8730E-01	4.7145E-03	1.8936E-01	-5.5393E-05	-2.8642E-02	1.3954E-03
7.666	7.6495E-02	9.4076E-02	3.6739E+00	1.3586E-02	1.8734E-01	4.7379E-03	1.8980E-01	1.6496E-04	-2.8628E-02	1.3599E-03
7.866	7.6346E-02	9.4509E-02	3.6532E+00	1.3557E-02	1.8714E-01	4.7541E-03	1.8996E-01	3.7692E-04	-2.8649E-02	1.3232E-03
8.066	7.6119E-02	9.4785E-02	3.6301E+00	1.3514E-02	1.8674E-01	4.7633E-03	1.8989E-01	5.6708E-04	-2.8632E-02	1.2885E-03
8.266	7.5823E-02	9.4926E-02	3.6049E+00	1.3459E-02	1.8616E-01	4.7666E-03	1.8960E-01	7.3758E-04	-2.8584E-02	1.2560E-03
8.466	7.5488E-02	9.4964E-02	3.5801E+00	1.3396E-02	1.8551E-01	4.7666E-03	1.8873E-01	8.8553E-04	-2.8516E-02	1.2275E-03
8.666	7.5081E-02	9.4855E-02	3.5551E+00	1.3308E-02	1.8480E-01	4.7565E-03	1.8741E-01	1.0338E-03	-2.8405E-02	1.1936E-03
8.866	7.4730E-02	9.4854E-02	3.5305E+00	1.3283E-02	1.8406E-01	4.7673E-03	1.8559E-01	1.0986E-03	-2.8361E-02	1.1924E-03
9.066	7.4531E-02	9.0581E-02	3.5023E+00	1.2972E-02	1.8312E-01	4.6440E-03	1.8262E-01	1.1881E-03	-2.7475E-02	1.0560E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.265	1.5066E-01	1.0295E-01	6.1056E+00	4.7688E-03	3.6126E-01	3.3796E-03	5.1412E-01	1.0352E-02	-2.0661E-02	-1.0555E-03
1.465	1.5542E-01	1.8457E-01	6.2766E+00	8.3478E-03	3.7756E-01	6.0818E-03	5.5203E-01	1.8508E-02	-3.6496E-02	-1.8045E-03
1.665	1.5740E-01	2.8499E-01	6.3358E+00	1.2626E-02	3.8783E-01	9.4246E-03	5.8377E-01	2.8177E-02	-5.5574E-02	-2.5657E-03
1.865	1.5705E-01	3.8920E-01	6.3047E+00	1.6946E-02	3.9321E-01	1.2919E-02	6.1050E-01	3.7528E-02	-7.4920E-02	-3.1004E-03
2.065	1.5473E-01	4.8310E-01	6.2007E+00	2.0718E-02	3.9460E-01	1.6106E-02	6.3299E-01	4.5059E-02	-9.1849E-02	-3.2628E-03
2.265	1.5078E-01	5.5896E-01	6.0387E+00	2.3628E-02	3.9274E-01	1.8734E-02	6.5178E-01	5.0183E-02	-1.0494E-01	-3.0532E-03
2.465	1.4549E-01	6.1525E-01	5.8313E+00	2.5622E-02	3.8827E-01	2.0749E-02	6.6720E-01	5.3057E-02	-1.1399E-01	-2.5627E-03
2.665	1.3912E-01	6.5335E-01	5.5851E+00	2.6800E-02	3.8171E-01	2.2204E-02	6.7954E-01	5.4153E-02	-1.1945E-01	-1.9008E-03
2.865	1.3147E-01	6.7816E-01	5.3221E+00	2.7316E-02	3.7357E-01	2.3192E-02	6.8872E-01	5.3961E-02	-1.2199E-01	-1.1562E-03
3.065	1.2362E-01	6.9071E-01	5.0462E+00	2.7320E-02	3.6465E-01	2.3800E-02	6.9282E-01	5.2872E-02	-1.2225E-01	-3.8787E-04
3.265	1.1553E-01	6.9466E-01	4.7867E+00	2.6936E-02	3.5534E-01	2.4103E-02	6.9157E-01	5.1163E-02	-1.2075E-01	3.7139E-04
3.465	1.0819E-01	6.8577E-01	4.5367E+00	2.6277E-02	3.4570E-01	2.3892E-02	6.8588E-01	4.7814E-02	-1.1775E-01	1.1323E-03
3.665	1.0154E-01	6.6945E-01	4.3070E+00	2.5435E-02	3.3585E-01	2.3543E-02	6.7722E-01	4.4210E-02	-1.1387E-01	1.8029E-03
3.865	9.5538E-02	6.5247E-01	4.0998E+00	2.4596E-02	3.2619E-01	2.3156E-02	6.6805E-01	4.1027E-02	-1.1004E-01	2.3694E-03
4.065	9.0067E-02	6.3221E-01	3.9089E+00	2.3727E-02	3.1670E-01	2.2616E-02	6.5798E-01	3.7716E-02	-1.0615E-01	2.8239E-03
4.265	8.5050E-02	6.1318E-01	3.7307E+00	2.2889E-02	3.0726E-01	2.2085E-02	6.4684E-01	3.4866E-02	-1.0251E-01	3.1924E-03
4.466	8.0418E-02	5.9528E-01	3.5635E+00	2.2047E-02	2.9787E-01	2.1563E-02	6.3476E-01	3.2410E-02	-9.8976E-02	3.4729E-03
4.666	7.6015E-02	5.7810E-01	3.3975E+00	2.1175E-02	2.8742E-01	2.1033E-02	6.1880E-01	3.0362E-02	-9.5442E-02	3.6581E-03
4.866	7.1947E-02	5.5898E-01	3.2431E+00	2.0174E-02	2.7737E-01	2.0326E-02	6.0317E-01	2.8323E-02	-9.1525E-02	3.7048E-03
5.066	6.8173E-02	5.4022E-01	3.0954E+00	1.9085E-02	2.6775E-01	1.9613E-02	5.8805E-01	2.6689E-02	-8.7409E-02	3.6409E-03
5.266	6.4526E-02	5.1970E-01	2.9651E+00	1.7666E-02	2.5853E-01	1.8860E-02	5.7354E-01	2.5712E-02	-8.2179E-02	3.3449E-03
5.466	6.0933E-02	5.0506E-01	2.8395E+00	1.7004E-02	2.4969E-01	1.8267E-02	5.5948E-01	2.4116E-02	-7.9558E-02	3.4296E-03
5.666	5.7677E-02	4.5536E-01	2.7221E+00	1.5783E-02	2.4128E-01	1.6936E-02	5.4607E-01	1.7490E-02	-7.2724E-02	4.1146E-03
5.866	5.4620E-02	4.4315E-01	2.6103E+00	1.5273E-02	2.3266E-01	1.6377E-02	5.3212E-01	1.6195E-02	-7.0648E-02	4.1300E-03
6.066	5.1746E-02	4.3309E-01	2.5040E+00	1.4931E-02	2.2441E-01	1.6131E-02	5.1853E-01	1.4379E-02	-6.9130E-02	4.3354E-03
6.266	4.8956E-02	4.2365E-01	2.3937E+00	1.4611E-02	2.1659E-01	1.5896E-02	5.0559E-01	1.2688E-02	-6.7705E-02	4.5256E-03
6.466	4.6217E-02	4.1478E-01	2.2762E+00	1.4309E-02	2.0846E-01	1.5670E-02	4.9292E-01	1.1111E-02	-6.6365E-02	4.7020E-03
6.666	4.3939E-02	4.0671E-01	2.1756E+00	1.4075E-02	2.0150E-01	1.5466E-02	4.8060E-01	9.5722E-03	-6.5251E-02	4.9022E-03
6.866	4.1792E-02	3.9712E-01	2.0788E+00	1.3758E-02	1.9491E-01	1.5268E-02	4.6894E-01	8.1900E-03	-6.3700E-02	5.0723E-03
7.066	3.9765E-02	3.8829E-01	1.9874E+00	1.3482E-02	1.8867E-01	1.5081E-02	4.5789E-01	6.9121E-03	-6.2234E-02	5.2320E-03
7.266	3.7849E-02	3.7771E-01	1.9010E+00	1.3117E-02	1.8273E-01	1.4877E-02	4.4739E-01	5.9435E-03	-6.0325E-02	5.3272E-03
7.466	1.6016E-02	3.6560E-01	1.8180E+00	1.2768E-02	1.7692E-01	1.4515E-02	4.3699E-01	4.4407E-03	-5.8426E-02	5.4424E-03
7.666	3.3670E-02	3.5412E-01	1.6789E+00	1.2437E-02	1.6743E-01	1.4169E-02	4.1165E-01	3.0204E-03	-5.6625E-02	5.5508E-03
7.866	3.1442E-02	3.4507E-01	1.5468E+00	1.2200E-02	1.5840E-01	1.3843E-02	3.8755E-01	1.7598E-03	-5.5153E-02	5.6424E-03
8.066	2.9323E-02	3.3647E-01	1.4711E+00	1.1974E-02	1.4978E-01	1.3530E-02	3.6458E-01	5.6555E-04	-5.3753E-02	5.7287E-03
8.266	2.7305E-02	3.2790E-01	1.3014E+00	1.1670E-02	1.4155E-01	1.3183E-02	3.4268E-01	-4.3390E-04	-5.2241E-02	5.7467E-03
8.466	2.5933E-02	3.1966E-01	1.2526E+00	1.1363E-02	1.3615E-01	1.2842E-02	3.0901E-01	-1.3573E-03	-5.0767E-02	5.7516E-03
8.666	2.3033E-02	3.1106E-01	1.1327E+00	1.0895E-02	1.2801E-01	1.2420E-02	2.9149E-01	-1.9725E-03	-4.9019E-02	5.6349E-03
8.866	2.0008E-02	3.0502E-01	1.0164E+00	1.0991E-02	1.2011E-01	1.2279E-02	2.7504E-01	-3.3147E-03	-4.8373E-02	5.8902E-03
9.066	1.4653E-02	2.6666E-01	8.6954E-01	7.2207E-03	1.0917E-01	1.0474E-02	2.6039E-01	8.8910E-04	-3.7501E-02	3.6645E-03

TEST 2400

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    9.8500
BEAM AT MIDSHIP=    3.7324

DISPLACED VOLUME/(L/2)**3=    .619312E-01
LONGITUDINAL CENTER OF BUYANCY/(L/2)=    .136134E+01
VERTICAL CENTER OF BUYANCY/L=  -.162941E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .330958E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .367939E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .312153E+01
PITCH-PITCH RESTORING COEFFICIENT=    .248497E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .590000E+00
TOTAL MASS=      .0064
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .114200E+00
(YAW-RADIUS OF GYRATION/L)**2=    .114200E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 38).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.305	1.9718E-02	3.0421E-01	6.0014E+00	3.0801E-02	3.3692E-01	1.5802E-02	3.2991E-01	1.3288E-02	-8.4815E-02	-9.0884E-04
1.536	1.7350E-02	3.0715E-01	5.3217E+00	3.0837E-02	2.9831E-01	1.5992E-02	2.9197E-01	1.3235E-02	-8.5190E-02	-8.0022E-04
1.767	1.5590E-02	3.0016E-01	4.8337E+00	3.0014E-02	2.6993E-01	1.5761E-02	2.6201E-01	1.2060E-02	-8.2761E-02	-4.7344E-04
1.998	1.4259E-02	2.8389E-01	4.4800E+00	2.8440E-02	2.4880E-01	1.5125E-02	2.3771E-01	9.9544E-03	-7.7808E-02	5.9336E-06
2.229	1.3241E-02	2.6169E-01	4.2235E+00	2.6430E-02	2.3295E-01	1.4214E-02	2.1752E-01	7.4091E-03	-7.1333E-02	5.2173E-04
2.460	1.2459E-02	2.3738E-01	4.0388E+00	2.4320E-02	2.2105E-01	1.3183E-02	2.0040E-01	4.8971E-03	-6.4428E-02	9.7905E-04
2.691	1.1857E-02	2.1376E-01	3.9083E+00	2.2343E-02	2.1215E-01	1.2149E-02	1.8565E-01	2.6956E-03	-5.7865E-02	1.3342E-03
2.922	1.1395E-02	1.9232E-01	3.8188E+00	2.0611E-02	2.0556E-01	1.1180E-02	1.7278E-01	8.9695E-04	-5.2034E-02	1.5840E-03
3.153	1.1044E-02	1.7359E-01	3.7604E+00	1.9157E-02	2.0075E-01	1.0305E-02	1.6150E-01	-5.1392E-04	-4.7058E-02	1.7447E-03
3.384	1.0779E-02	1.5759E-01	3.7253E+00	1.7966E-02	1.9730E-01	9.5338E-03	1.5159E-01	-1.5946E-03	-4.2912E-02	1.8372E-03
3.615	1.0760E-02	1.4409E-01	3.7798E+00	1.7006E-02	1.9934E-01	8.8626E-03	1.2519E-01	-2.4095E-03	-3.9504E-02	1.8808E-03
3.846	1.1036E-02	1.3278E-01	3.9336E+00	1.6238E-02	2.0461E-01	8.2843E-03	8.5913E-02	-3.0153E-03	-3.6723E-02	1.8910E-03
4.077	1.1342E-02	1.2471E-01	4.1064E+00	1.5950E-02	2.0848E-01	7.8819E-03	5.4560E-02	-3.1060E-03	-3.5174E-02	1.6939E-03
4.308	1.1653E-02	1.1816E-01	4.2970E+00	1.5870E-02	2.1182E-01	7.5307E-03	3.7219E-02	-3.1338E-03	-3.4180E-02	1.4960E-03
4.539	1.2005E-02	1.1248E-01	4.4922E+00	1.5769E-02	2.1633E-01	7.2178E-03	3.5951E-02	-3.1681E-03	-3.3288E-02	1.3395E-03
4.770	1.2296E-02	1.0781E-01	4.6472E+00	1.5757E-02	2.2055E-01	6.9451E-03	3.9819E-02	-3.2457E-03	-3.2671E-02	1.2356E-03
5.002	1.2541E-02	1.0429E-01	4.7702E+00	1.5861E-02	2.2488E-01	6.7158E-03	4.8002E-02	-3.3520E-03	-3.2404E-02	1.1602E-03
5.233	1.2755E-02	1.0110E-01	4.8693E+00	1.5937E-02	2.3013E-01	6.5243E-03	6.0858E-02	-3.5092E-03	-3.2167E-02	1.1249E-03
5.464	1.2895E-02	9.8199E-02	4.9354E+00	1.5944E-02	2.3383E-01	6.3483E-03	7.1655E-02	-3.6478E-03	-3.1841E-02	1.0963E-03
5.695	1.3002E-02	9.5418E-02	4.9792E+00	1.5962E-02	2.3716E-01	6.1998E-03	8.2566E-02	-3.8147E-03	-3.1573E-02	1.0854E-03
5.926	1.3058E-02	9.2774E-02	5.0015E+00	1.5962E-02	2.3934E-01	6.0754E-03	9.1692E-02	-3.9885E-03	-3.1299E-02	1.0881E-03
6.157	1.3071E-02	9.0370E-02	5.0066E+00	1.5924E-02	2.4057E-01	5.9747E-03	9.9334E-02	-4.1780E-03	-3.1004E-02	1.0990E-03
6.388	1.3072E-02	8.8434E-02	4.9996E+00	1.5893E-02	2.4153E-01	5.9221E-03	1.0664E-01	-4.3916E-03	-3.0774E-02	1.1111E-03
6.619	1.3043E-02	8.6551E-02	4.9817E+00	1.5828E-02	2.4179E-01	5.8643E-03	1.1273E-01	-4.5697E-03	-3.0500E-02	1.1192E-03
6.850	1.3006E-02	8.4724E-02	4.9629E+00	1.5735E-02	2.4208E-01	5.8030E-03	1.1560E-01	-4.7183E-03	-3.0194E-02	1.1241E-03
7.081	1.3001E-02	8.3115E-02	4.9476E+00	1.5636E-02	2.4289E-01	5.7544E-03	1.2132E-01	-4.7928E-03	-2.9901E-02	1.1143E-03
7.312	1.2971E-02	8.1620E-02	4.9243E+00	1.5533E-02	2.4311E-01	5.7064E-03	1.2611E-01	-4.8699E-03	-2.9619E-02	1.1116E-03
7.543	1.2931E-02	8.0168E-02	4.8989E+00	1.5414E-02	2.4327E-01	5.6592E-03	1.2875E-01	-4.9394E-03	-2.9317E-02	1.1082E-03
7.774	1.2874E-02	7.8778E-02	4.8678E+00	1.5286E-02	2.4299E-01	5.6103E-03	1.3086E-01	-5.0018E-03	-2.8977E-02	1.1023E-03
8.005	1.2802E-02	7.7187E-02	4.8320E+00	1.5134E-02	2.4233E-01	5.5547E-03	1.3252E-01	-5.0210E-03	-2.8581E-02	1.0893E-03
8.236	1.2717E-02	7.5823E-02	4.7926E+00	1.4961E-02	2.4136E-01	5.5058E-03	1.3380E-01	-4.9946E-03	-2.8209E-02	1.0703E-03
8.467	1.2624E-02	7.3883E-02	4.7519E+00	1.4869E-02	2.4015E-01	5.4256E-03	1.3462E-01	-5.0995E-03	-2.7823E-02	1.0547E-03
8.698	1.2522E-02	7.3022E-02	4.7086E+00	1.4720E-02	2.3873E-01	5.3943E-03	1.3517E-01	-4.9731E-03	-2.7528E-02	1.0193E-03
8.929	1.2415E-02	7.1797E-02	4.6636E+00	1.4565E-02	2.3713E-01	5.3433E-03	1.3549E-01	-4.9374E-03	-2.7183E-02	9.9736E-04
9.160	1.2305E-02	7.0286E-02	4.6201E+00	1.4400E-02	2.3561E-01	5.2779E-03	1.3479E-01	-4.9850E-03	-2.6793E-02	9.9183E-04
9.391	1.2196E-02	7.0184E-02	4.5771E+00	1.4300E-02	2.3411E-01	5.2845E-03	1.3345E-01	-4.7729E-03	-2.6654E-02	9.4589E-04
9.622	1.2146E-02	6.8809E-02	4.5571E+00	1.4143E-02	2.3283E-01	5.2271E-03	1.3049E-01	-4.8265E-03	-2.6284E-02	9.4238E-04
9.853	1.2120E-02	7.0057E-02	4.5636E+00	1.4180E-02	2.3144E-01	5.1878E-03	1.3255E-01	-4.9389E-03	-2.6683E-02	9.4216E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.305	2.9196E-02	5.5599E-02	8.5789E+00	4.9098E-03	4.7308E-01	2.3793E-03	4.4364E-01	5.6879E-03	-1.5821E-02	-1.0864E-03
1.536	3.0872E-02	1.0703E-01	8.9187E+00	9.2535E-03	4.9802E-01	4.6204E-03	4.8872E-01	1.0856E-02	-3.0082E-02	-2.0068E-03
1.767	3.1998E-02	1.7410E-01	9.0809E+00	1.4735E-02	5.1352E-01	7.5919E-03	5.2779E-01	1.7282E-02	-4.8315E-02	-3.0593E-03
1.998	3.2679E-02	2.4756E-01	9.1032E+00	2.0512E-02	5.2145E-01	1.0922E-02	5.6205E-01	2.3748E-02	-6.7814E-02	-3.9767E-03
2.229	3.2994E-02	3.1754E-01	9.0144E+00	2.5750E-02	5.2332E-01	1.4197E-02	5.9233E-01	2.9153E-02	-8.5822E-02	-4.5583E-03
2.460	3.3006E-02	3.7767E-01	8.8379E+00	2.9951E-02	5.2033E-01	1.7137E-02	6.1914E-01	3.2992E-02	-1.0064E-01	-4.7514E-03
2.691	3.2769E-02	4.2567E-01	8.5929E+00	3.2978E-02	5.1344E-01	1.9619E-02	6.4282E-01	3.5301E-02	-1.1174E-01	-4.6143E-03
2.922	3.2325E-02	4.6191E-01	8.2953E+00	3.4923E-02	5.0348E-01	2.1628E-02	6.6356E-01	3.6370E-02	-1.1933E-01	-4.2425E-03
3.153	3.1711E-02	4.8789E-01	7.9579E+00	3.5964E-02	4.9110E-01	2.3199E-02	6.8156E-01	3.6528E-02	-1.2393E-01	-3.7230E-03
3.384	3.0957E-02	5.0534E-01	7.5907E+00	3.6289E-02	4.7683E-01	2.4383E-02	6.9710E-01	3.6045E-02	-1.2610E-01	-3.1180E-03
3.615	3.0104E-02	5.1580E-01	7.2149E+00	3.6063E-02	4.6202E-01	2.5229E-02	7.0695E-01	3.5113E-02	-1.2632E-01	-2.4648E-03
3.846	2.9247E-02	5.2050E-01	6.8582E+00	3.5410E-02	4.4805E-01	2.5785E-02	7.0662E-01	3.3854E-02	-1.2496E-01	-1.7804E-03
4.077	2.8428E-02	5.1545E-01	6.5369E+00	3.4513E-02	4.3402E-01	2.5772E-02	6.9978E-01	3.1098E-02	-1.2230E-01	-1.0812E-03
4.308	2.7735E-02	5.0805E-01	6.2889E+00	3.3541E-02	4.2087E-01	2.5675E-02	6.9527E-01	2.8636E-02	-1.1950E-01	-5.4675E-04
4.539	2.6738E-02	4.9969E-01	5.9650E+00	3.2454E-02	4.0263E-01	2.5525E-02	6.6633E-01	2.6562E-02	-1.1632E-01	-1.1313E-04
4.770	2.5773E-02	4.9041E-01	5.6712E+00	3.1281E-02	3.8491E-01	2.5310E-02	6.3694E-01	2.4881E-02	-1.1289E-01	2.1987E-04
5.002	2.4793E-02	4.8040E-01	5.3860E+00	3.0123E-02	3.6684E-01	2.5039E-02	6.0489E-01	2.3616E-02	-1.0960E-01	3.8692E-04
5.233	2.3786E-02	4.6948E-01	5.1094E+00	2.8774E-02	3.4741E-01	2.4682E-02	5.6871E-01	2.2810E-02	-1.0584E-01	4.0138E-04
5.464	2.2844E-02	4.5803E-01	4.8547E+00	2.7354E-02	3.2925E-01	2.4314E-02	5.3486E-01	2.2163E-02	-1.0173E-01	3.9287E-04
5.695	2.1932E-02	4.4902E-01	4.6177E+00	2.6291E-02	3.1182E-01	2.3918E-02	5.0225E-01	2.1796E-02	-9.8874E-02	2.9864E-04
5.926	2.1078E-02	4.4249E-01	4.3986E+00	2.5611E-02	2.9556E-01	2.3524E-02	4.7185E-01	2.1390E-02	-9.7193E-02	2.7011E-04
6.157	2.0276E-02	4.3622E-01	4.1953E+00	2.4968E-02	2.8034E-01	2.3114E-02	4.4340E-01	2.1114E-02	-9.5590E-02	2.2154E-04
6.388	1.9501E-02	4.2952E-01	4.0055E+00	2.4332E-02	2.6588E-01	2.2802E-02	4.1638E-01	2.0397E-02	-9.3822E-02	2.8930E-04
6.619	1.8774E-02	4.2325E-01	3.8289E+00	2.3739E-02	2.5236E-01	2.2500E-02	3.9113E-01	1.9751E-02	-9.2173E-02	3.5023E-04
6.850	1.8072E-02	4.1737E-01	3.6584E+00	2.3186E-02	2.3929E-01	2.2206E-02	3.6896E-0	1.9170E-02	-9.0632E-02	4.0509E-04
7.081	1.7330E-02	4.0876E-01	3.4796E+00	2.2601E-02	2.2564E-01	2.1631E-02	3.4289E-01	1.7702E-02	-8.8869E-02	5.5263E-04
7.312	1.6634E-02	4.0049E-01	3.3121E+00	2.2023E-02	2.1285E-01	2.1073E-02	3.1845E-01	1.6383E-02	-8.7147E-02	6.7358E-04
7.543	1.5948E-02	3.9265E-01	3.1481E+00	2.1480E-02	2.0019E-01	2.0525E-02	2.9754E-01	1.5190E-02	-8.5518E-02	7.8097E-04
7.774	1.5301E-02	3.7957E-01	2.9938E+00	2.0134E-02	1.8828E-01	1.9891E-02	2.7786E-01	1.4870E-02	-8.1443E-02	5.3025E-04
8.005	1.4691E-02	3.6977E-01	2.8484E+00	1.9376E-02	1.7704E-01	1.9331E-02	2.5930E-01	1.4246E-02	-7.9107E-02	4.9009E-04
8.236	1.4113E-02	3.4543E-01	2.7112E+00	1.8078E-02	1.6643E-01	1.8073E-02	2.4177E-01	1.0360E-02	-7.4476E-02	9.8344E-04
8.467	1.3427E-02	3.6261E-01	2.5289E+00	1.8570E-02	1.5613E-01	1.8812E-02	2.2881E-01	1.5512E-02	-7.6476E-02	5.0452E-05
8.698	1.2776E-02	3.4482E-01	2.3563E+00	1.7496E-02	1.4637E-01	1.7870E-02	2.1652E-01	1.2931E-02	-7.2951E-02	3.5513E-04
8.929	1.2157E-02	3.3098E-01	2.1927E+00	1.6617E-02	1.3711E-01	1.7077E-02	2.0486E-01	1.1467E-02	-7.0017E-02	4.3140E-04
9.160	1.1542E-02	3.0904E-01	2.0414E+00	1.5433E-02	1.2860E-01	1.5809E-02	1.9265E-01	8.8279E-03	-6.5897E-02	6.0643E-04
9.391	1.0902E-02	3.2213E-01	1.8758E+00	1.5388E-02	1.1893E-01	1.6189E-02	1.8687E-01	1.4190E-02	-6.6506E-02	-3.9175E-04
9.622	9.7587E-03	3.0649E-01	1.5776E+00	1.4842E-02	1.0297E-01	1.5468E-02	2.0722E-01	1.0664E-02	-6.4182E-02	1.8206E-04
9.853	8.7705E-03	2.6823E-01	1.1656E+00	1.2718E-02	1.0329E-01	1.3280E-02	1.0324E-01	6.3424E-03	-5.6597E-02	3.7718E-04

TEST 2500

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=     9.8500
BEAM AT MIDSHIP=     3.7324

DISPLACED VOLUME/(L/2)**3=    .619312E-01
LONGITUDINAL CENTER OF BOUYANCY/(L/2)=    .136134E+01
VERTICAL CENTER OF BOUYANCY/L=  -.162941E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .330958E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .367939E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .312153E+01
PITCH-PITCH RESTORING COEFFICIENT=    .248497E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .590000E+00
TOTAL MASS=      .0064
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .114200E+00
(YAW-RADIUS OF GYRATION/L)**2=    .114200E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 38).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.305	1.9718E-02	3.0421E-01	6.0014E+00	3.0801E-02	3.3692E-01	1.5802E-02	3.2991E-01	1.3288E-02	-8.4815E-02	-9.0884E-04
1.536	1.7350E-02	3.0715E-01	5.3217E+00	3.0837E-02	2.9831E-01	1.5992E-02	2.9197E-01	1.3235E-02	-8.5190E-02	-8.0022E-04
1.767	1.5590E-02	3.0016E-01	4.8337E+00	3.0014E-02	2.6993E-01	1.5761E-02	2.6201E-01	1.2060E-02	-8.2761E-02	-4.7344E-04
1.998	1.4259E-02	2.8389E-01	4.4800E+00	2.8440E-02	2.4880E-01	1.5125E-02	2.3771E-01	9.9544E-03	-7.7808E-02	5.9336E-06
2.229	1.3241E-02	2.6169E-01	4.2235E+00	2.6430E-02	2.3295E-01	1.4214E-02	2.1752E-01	7.4091E-03	-7.1333E-02	5.2173E-04
2.460	1.2459E-02	2.3738E-01	4.0388E+00	2.4320E-02	2.2105E-01	1.3183E-02	2.0040E-01	4.8971E-03	-6.4428E-02	9.7905E-04
2.691	1.1857E-02	2.1376E-01	3.9083E+00	2.2343E-02	2.1215E-01	1.2149E-02	1.8565E-01	2.6956E-03	-5.7865E-02	1.3342E-03
2.922	1.1395E-02	1.9232E-01	3.8188E+00	2.0611E-02	2.0556E-01	1.1180E-02	1.7278E-01	8.9695E-04	-5.2034E-02	1.5840E-03
3.153	1.1044E-02	1.7359E-01	3.7604E+00	1.9157E-02	2.0075E-01	1.0305E-02	1.6150E-01	-5.1392E-04	-4.7058E-02	1.7447E-03
3.384	1.0779E-02	1.5759E-01	3.7253E+00	1.7966E-02	1.9730E-01	9.5338E-03	1.5159E-01	-1.5946E-03	-4.2912E-02	1.8372E-03
3.615	1.0760E-02	1.4409E-01	3.7758E+00	1.7006E-02	1.9934E-01	8.8626E-03	1.2519E-01	-2.4095E-03	-3.9504E-02	1.8808E-03
3.846	1.1036E-02	1.3278E-01	3.9336E+00	1.6238E-02	2.0461E-01	8.2843E-03	8.5913E-02	-3.0153E-03	-3.6723E-02	1.8910E-03
4.077	1.1342E-02	1.2471E-01	4.1004E+00	1.5950E-02	2.0848E-01	7.8819E-03	5.4560E-02	-3.1060E-03	-3.5174E-02	1.6939E-03
4.308	1.1653E-02	1.1816E-01	4.2970E+00	1.5870E-02	2.1182E-01	7.5307E-03	3.7219E-02	-3.1338E-03	-3.4180E-02	1.4960E-03
4.539	1.2005E-02	1.1248E-01	4.4922E+00	1.5769E-02	2.1633E-01	7.2178E-03	3.5951E-02	-3.1681E-03	-3.3288E-02	1.3395E-03
4.770	1.2296E-02	1.0781E-01	4.6472E+00	1.5757E-02	2.2055E-01	6.9451E-03	3.9819E-02	-3.2457E-03	-3.2671E-02	1.2356E-03
5.002	1.2541E-02	1.0420E-01	4.7702E+00	1.5861E-02	2.2488E-01	6.7158E-03	4.8002E-02	-3.3520E-03	-3.2404E-02	1.1602E-03
5.233	1.2755E-02	1.0110E-01	4.8653E+00	1.5937E-02	2.3013E-01	6.5243E-03	6.0858E-02	-3.5092E-03	-3.2167E-02	1.1249E-03
5.464	1.2895E-02	9.8199E-02	4.9354E+00	1.5944E-02	2.3383E-01	6.3483E-03	7.1655E-02	-3.6478E-03	-3.1841E-02	1.0963E-03
5.695	1.3002E-02	9.5418E-02	4.9792E+00	1.5962E-02	2.3716E-01	6.1998E-03	8.2566E-02	-3.8147E-03	-3.1573E-02	1.0854E-03
5.926	1.3058E-02	9.2774E-02	5.0015E+00	1.5962E-02	2.3934E-01	6.0754E-03	9.1692E-02	-3.9885E-03	-3.1299E-02	1.0881E-03
6.157	1.3071E-02	9.0370E-02	5.0066E+00	1.5924E-02	2.4057E-01	5.9747E-03	9.9334E-02	-4.1780E-03	-3.1004E-02	1.0990E-03
6.389	1.3072E-02	8.8434E-02	4.9996E+00	1.5893E-02	2.4153E-01	5.9221E-03	1.0664E-01	-4.3916E-03	-3.0774E-02	1.1111E-03
6.619	1.3043E-02	8.6551E-02	4.9817E+00	1.5828E-02	2.4179E-01	5.8643E-03	1.1273E-01	-4.5697E-03	-3.0500E-02	1.1192E-03
6.850	1.3006E-02	8.4724E-02	4.9629E+00	1.5735E-02	2.4208E-01	5.8030E-03	1.1560E-01	-4.7183E-03	-3.0194E-02	1.1241E-03
7.091	1.3001E-02	8.3115E-02	4.9476E+00	1.5636E-02	2.4289E-01	5.7544E-03	1.2132E-01	-4.7928E-03	-2.9901E-02	1.1143E-03
7.312	1.2971E-02	8.1620E-02	4.9243E+00	1.5533E-02	2.4311E-01	5.7064E-03	1.2611E-01	-4.9699E-03	-2.9619E-02	1.1116E-03
7.543	1.2931E-02	8.0168E-02	4.8989E+00	1.5414E-02	2.4327E-01	5.6592E-03	1.2875E-01	-4.9394E-03	-2.9317E-02	1.1082E-03
7.774	1.2874E-02	7.8778E-02	4.8678E+00	1.5286E-02	2.4299E-01	5.6103E-03	1.3086E-01	-5.0018E-03	-2.8977E-02	1.1023E-03
8.005	1.2802E-02	7.7167E-02	4.8320E+00	1.5134E-02	2.4233E-01	5.5547E-03	1.3252E-01	-5.0210E-03	-2.8581E-02	1.0893E-03
8.236	1.2717E-02	7.5823E-02	4.7926E+00	1.4961E-02	2.4136E-01	5.5058E-03	1.3380E-01	-4.9946E-03	-2.8209E-02	1.0703E-03
8.467	1.2624E-02	7.3883E-02	4.7519E+00	1.4869E-02	2.4015E-01	5.4256E-03	1.3462E-01	-5.0995E-03	-2.7823E-02	1.0547E-03
8.698	1.2522E-02	7.3022E-02	4.7088E+00	1.4720E-02	2.3873E-01	5.3943E-03	1.3517E-01	-4.9731E-03	-2.7528E-02	1.0193E-03
8.929	1.2415E-02	7.1797E-02	4.6636E+00	1.4565E-02	2.3713E-01	5.3433E-03	1.3549E-01	-4.9374E-03	-2.7183E-02	9.9736E-04
9.160	1.2305E-02	7.0286E-02	4.6201E+00	1.4409E-02	2.3561E-01	5.2779E-03	1.3479E-01	-4.9850E-03	-2.6793E-02	9.9183E-04
9.391	1.2196E-02	7.0184E-02	4.5771E+00	1.4300E-02	2.3411E-01	5.2845E-03	1.3345E-01	-4.7729E-03	-2.6654E-02	9.4589E-04
9.622	1.2146E-02	6.8809E-02	4.5571E+00	1.4143E-02	2.3283E-01	5.2271E-03	1.3040E-01	-4.8265E-03	-2.6284E-02	9.4238E-04
9.853	1.2120E-02	7.0057E-02	4.5636E+00	1.4180E-02	2.3144E-01	5.1878E-03	1.3255E-01	-4.9389E-03	-2.6683E-02	9.4216E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.305	2.9196E-02	5.5599E-02	8.5789E+00	4.9098E-03	4.7308E-01	2.3793E-03	4.4364E-01	5.6879E-03	-1.5821E-02	-1.0864E-03
1.536	3.0872E-02	1.0703E-01	8.9187E+00	9.2535E-03	4.9802E-01	4.6204E-03	4.8872E-01	1.0856E-02	-3.0082E-02	-2.0068E-03
1.767	3.1998E-02	1.7410E-01	9.0809E+00	1.4735E-02	5.1352E-01	7.5919E-03	5.2779E-01	1.7282E-02	-4.8315E-02	-3.0593E-03
1.998	3.2679E-02	2.4756E-01	9.1032E+00	2.0512E-02	5.2145E-01	1.0922E-02	5.6205E-01	2.3748E-02	-6.7814E-02	-3.9767E-03
2.229	3.2994E-02	3.1754E-01	9.0144E+00	2.5750E-02	5.2332E-01	1.4197E-02	5.9233E-01	2.9153E-02	-8.5822E-02	-4.5583E-03
2.460	3.3006E-02	3.7767E-01	8.8379E+00	2.9951E-02	5.2033E-01	1.7137E-02	6.1914E-01	3.2992E-02	-1.0064E-01	-4.7514E-03
2.691	3.2769E-02	4.2567E-01	8.5929E+00	3.2978E-02	5.1344E-01	1.9619E-02	6.4282E-01	3.5301E-02	-1.1174E-01	-4.6143E-03
2.922	3.2325E-02	4.6191E-01	8.2953E+00	3.4923E-02	5.0348E-01	2.1628E-02	6.6356E-01	3.6370E-02	-1.1933E-01	-4.2425E-03
3.153	3.1711E-02	4.8789E-01	7.9579E+00	3.5964E-02	4.9110E-01	2.3199E-02	6.8156E-01	3.6528E-02	-1.2393E-01	-3.7230E-03
3.384	3.0957E-02	5.0534E-01	7.5907E+00	3.6289E-02	4.7683E-01	2.4383E-02	6.9710E-01	3.6045E-02	-1.2610E-01	-3.1180E-03
3.615	3.0104E-02	5.1580E-01	7.2149E+00	3.6063E-02	4.6202E-01	2.5229E-02	7.0695E-01	3.5113E-02	-1.2632E-01	-2.4648E-03
3.846	2.9247E-02	5.2050E-01	6.8582E+00	3.5410E-02	4.4805E-01	2.5785E-02	7.0662E-01	3.3854E-02	-1.2496E-01	-1.7804E-03
4.077	2.8428E-02	5.1545E-01	6.5369E+00	3.4513E-02	4.3402E-01	2.5772E-02	6.9978E-01	3.1098E-02	-1.2230E-01	-1.0812E-03
4.308	2.7735E-02	5.0805E-01	6.2889E+00	3.3541E-02	4.2087E-01	2.5675E-02	6.9527E-01	2.8636E-02	-1.1950E-01	-5.4675E-04
4.539	2.6738E-02	4.9969E-01	5.9650E+00	3.2454E-02	4.0263E-01	2.5525E-02	6.6633E-01	2.6562E-02	-1.1632E-01	-1.1313E-04
4.770	2.5773E-02	4.9041E-01	5.6712E+00	3.1281E-02	3.8491E-01	2.5310E-02	6.3694E-01	2.4881E-02	-1.1289E-01	2.1987E-04
5.002	2.4793E-02	4.8040E-01	5.3860E+00	3.0123E-02	3.6684E-01	2.5039E-02	6.0489E-01	2.3616E-02	-1.0960E-01	3.8692E-04
5.233	2.3786E-02	4.6948E-01	5.1094E+00	2.8774E-02	3.4741E-01	2.4682E-02	5.6871E-01	2.2810E-02	-1.0584E-01	4.0138E-04
5.464	2.2844E-02	4.5803E-01	4.8547E+00	2.7354E-02	3.2925E-01	2.4314E-02	5.3486E-01	2.2163E-02	-1.0173E-01	3.9287E-04
5.695	2.1932E-02	4.4902E-01	4.6177E+00	2.6291E-02	3.1182E-01	2.3918E-02	5.0225E-01	2.1796E-02	-9.8874E-02	2.9864E-04
5.926	2.1078E-02	4.4249E-01	4.3986E+00	2.5611E-02	2.9556E-01	2.3524E-02	4.7185E-01	2.1390E-02	-9.7193E-02	2.7011E-04
6.157	2.0276E-02	4.3622E-01	4.1953E+00	2.4968E-02	2.8034E-01	2.3114E-02	4.4340E-01	2.1114E-02	-9.5590E-02	2.2154E-04
6.388	1.9501E-02	4.2952E-01	4.0055E+00	2.4332E-02	2.6588E-01	2.2802E-02	4.1638E-01	2.0397E-02	-9.3822E-02	2.8930E-04
6.619	1.8774E-02	4.2325E-01	3.8289E+00	2.3739E-02	2.5236E-01	2.2500E-02	3.9113E-01	1.9751E-02	-9.2173E-02	3.5023E-04
6.850	1.8072E-02	4.1737E-01	3.6584E+00	2.3186E-02	2.3929E-01	2.2206E-02	3.6896E-01	1.9170E-02	-9.0632E-02	4.0509E-04
7.081	1.7330E-02	4.0876E-01	3.4796E+00	2.2601E-02	2.2564E-01	2.1631E-02	3.4289E-01	1.7702E-02	-8.8869E-02	5.5263E-04
7.312	1.6634E-02	4.0049E-01	3.3121E+00	2.2023E-02	2.1285E-01	2.1073E-02	3.1845E-01	1.6383E-02	-8.7147E-02	6.7358E-04
7.543	1.5948E-02	3.9265E-01	3.1481E+00	2.1480E-02	2.0019E-01	2.0525E-02	2.9754E-01	1.5190E-02	-8.5518E-02	7.8097E-04
7.774	1.5301E-02	3.7957E-01	2.9938E+00	2.0134E-02	1.8828E-01	1.9891E-02	2.7786E-01	1.4870E-02	-8.1443E-02	5.3025E-04
8.005	1.4691E-02	3.6977E-01	2.8484E+00	1.9376E-02	1.7704E-01	1.9331E-02	2.5930E-01	1.4246E-02	-7.9107E-02	4.9009E-04
8.236	1.4113E-02	3.4543E-01	2.7112E+00	1.8078E-02	1.6643E-01	1.8073E-02	2.4177E-01	1.0360E-02	-7.4476E-02	9.8344E-04
8.467	1.3427E-02	3.6261E-01	2.5289E+00	1.8570E-02	1.5613E-01	1.8812E-02	2.2881E-01	1.5512E-02	-7.6476E-02	5.0452E-05
8.698	1.2776E-02	3.4482E-01	2.3563E+00	1.7496E-02	1.4637E-01	1.7870E-02	2.1652E-01	1.2931E-02	-7.2951E-02	3.5513E-04
8.929	1.2157E-02	3.3098E-01	2.1927E+00	1.6617E-02	1.3711E-01	1.7077E-02	2.0486E-01	1.1467E-02	-7.0017E-02	4.3140E-04
9.160	1.1542E-02	3.0904E-01	2.0414E+00	1.5433E-02	1.2860E-01	1.5809E-02	1.9265E-01	8.8279E-03	-6.5897E-02	6.0643E-04
9.391	1.0902E-02	3.2213E-01	1.8758E+00	1.5388E-02	1.1893E-01	1.6189E-02	1.8687E-01	1.4190E-02	-6.6506E-02	-3.9175E-04
9.622	9.7587E-03	3.0649E-01	1.5776E+00	1.4842E-02	1.0297E-01	1.5468E-02	2.0727E-01	1.0664E-02	-6.4182E-02	1.8206E-04
9.853	8.7705E-03	2.6823E-01	1.1656E+00	1.2718E-02	1.0329E-01	1.3280E-02	1.0324E-01	6.3424E-03	-5.6597E-02	3.7718E-04

TEST 2600

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=   11.0700
BEAM AT MIDSHIP=    2.6998

DISPLACED VOLUME/(L/2)**3=    .471007E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .104475E+01
VERTICAL CENTER OF BOYANCY/L=  -.208358E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .786661E-01
HEAVE-HEAVE RESTORING COEFFICIENT=    .294198E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .129135E+01
PITCH-PITCH RESTORING COEFFICIENT=    .173162E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .580000E+00
TOTAL MASS=      .0069
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .101700E+00
(YAW-RADIUS OF GYRATION/L)**2=    .101700E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.208	5.3692E-02	6.7927E-01	3.3255E+00	3.7142E-03	1.7186E-01	3.1357E-02	2.1354E-01	4.5246E-02	-3.9758E-02	1.4438E-03
1.416	4.7035E-02	7.0227E-01	2.9056E+00	3.8195E-03	1.5093E-01	3.2370E-02	1.9126E-01	4.6754E-02	-4.1159E-02	1.4800E-03
1.623	4.1747E-02	7.1957E-01	2.5847E+00	3.8853E-03	1.3462E-01	3.3287E-02	1.7429E-01	4.8207E-02	-4.2108E-02	1.5007E-03
1.831	3.7476E-02	7.2553E-01	2.3366E+00	3.8833E-03	1.2176E-01	3.3911E-02	1.6116E-01	4.9285E-02	-4.2240E-02	1.4986E-03
2.039	3.3983E-02	7.1595E-01	2.1434E+00	3.7972E-03	1.1152E-01	3.4047E-02	1.5090E-01	4.9615E-02	-4.1324E-02	1.4714E-03
2.246	3.1098E-02	6.8992E-01	1.9929E+00	3.6306E-03	1.0332E-01	3.3566E-02	1.4283E-01	4.8899E-02	-3.9368E-02	1.4224E-03
2.454	2.8698E-02	6.5012E-01	1.8759E+00	3.4051E-03	9.6746E-02	3.2452E-02	1.3646E-01	4.7057E-02	-3.6614E-02	1.3582E-03
2.662	2.6693E-02	6.0160E-01	1.7858E+00	3.1504E-03	9.1474E-02	3.0809E-02	1.3143E-01	4.4268E-02	-3.3426E-02	1.2848E-03
2.869	2.5015E-02	5.4975E-01	1.7172E+00	2.8932E-03	8.7266E-02	2.8815E-02	1.2747E-01	4.0882E-02	-3.0148E-02	1.2067E-03
3.077	2.3611E-02	4.9891E-01	1.6661E+00	2.6522E-03	8.3932E-02	2.6659E-02	1.2438E-01	3.7285E-02	-2.7030E-02	1.1270E-03
3.284	2.2438E-02	4.5189E-01	1.6292E+00	2.4372E-03	8.1321E-02	2.4503E-02	1.2200E-01	3.3788E-02	-2.4214E-02	1.0483E-03
3.492	2.1463E-02	4.1007E-01	1.6036E+00	2.2516E-03	7.9307E-02	2.2459E-02	1.2021E-01	3.0589E-02	-2.1756E-02	9.7273E-04
3.700	2.0672E-02	3.7383E-01	1.6176E+00	2.0949E-03	7.7849E-02	2.0589E-02	1.1833E-01	2.7786E-02	-1.9658E-02	9.0189E-04
3.907	2.0301E-02	3.4299E-01	1.6819E+00	1.9644E-03	7.7768E-02	1.8923E-02	1.2063E-01	2.5404E-02	-1.7893E-02	8.3691E-04
4.115	1.9995E-02	3.1706E-01	1.7333E+00	1.8569E-03	7.7911E-02	1.7465E-02	1.2170E-01	2.3424E-02	-1.6422E-02	7.7832E-04
4.322	1.9869E-02	2.9546E-01	1.7842E+00	1.7688E-03	7.8756E-02	1.6207E-02	1.2463E-01	2.1811E-02	-1.5205E-02	7.2621E-04
4.530	1.9810E-02	2.7986E-01	1.8278E+00	1.7252E-03	7.9903E-02	1.5149E-02	1.2888E-01	2.0402E-02	-1.4425E-02	6.9399E-04
4.738	1.9741E-02	2.6732E-01	1.8588E+00	1.6964E-03	8.0784E-02	1.4259E-02	1.3227E-01	1.9227E-02	-1.3822E-02	6.7160E-04
4.945	1.9761E-02	2.5770E-01	1.8855E+00	1.6802E-03	8.2053E-02	1.3530E-02	1.3614E-01	1.8321E-02	-1.3380E-02	6.5542E-04
5.153	1.9825E-02	2.5093E-01	1.9034E+00	1.6737E-03	8.3091E-02	1.2961E-02	1.3895E-01	1.7732E-02	-1.3079E-02	6.4242E-04
5.361	1.9905E-02	2.4540E-01	1.9174E+00	1.6681E-03	8.4352E-02	1.2510E-02	1.4255E-01	1.7386E-02	-1.2817E-02	6.3215E-04
5.568	1.9938E-02	2.4029E-01	1.9303E+00	1.6591E-03	8.5270E-02	1.2121E-02	1.4519E-01	1.7139E-02	-1.2559E-02	6.2133E-04
5.776	1.9932E-02	2.3555E-01	1.9367E+00	1.6473E-03	8.5905E-02	1.1785E-02	1.4721E-01	1.6974E-02	-1.2307E-02	6.1014E-04
5.983	1.9916E-02	2.3144E-01	1.9462E+00	1.6350E-03	8.6393E-02	1.1523E-02	1.4790E-01	1.6915E-02	-1.2072E-02	6.0274E-04
6.191	1.9923E-02	2.2750E-01	1.9549E+00	1.6208E-03	8.7054E-02	1.1290E-02	1.4841E-01	1.6886E-02	-1.1842E-02	5.9486E-04
6.399	1.9920E-02	2.2509E-01	1.9594E+00	1.6167E-03	8.7544E-02	1.1087E-02	1.4833E-01	1.6854E-02	-1.1720E-02	5.8914E-04
6.606	1.9978E-02	2.2315E-01	1.9623E+00	1.6143E-03	8.7999E-02	1.0928E-02	1.4733E-01	1.6822E-02	-1.1620E-02	5.8933E-04
6.814	1.9998E-02	2.2108E-01	1.9615E+00	1.6093E-03	8.8269E-02	1.0779E-02	1.4616E-01	1.6788E-02	-1.1510E-02	5.8851E-04
7.021	2.0020E-02	2.1923E-01	1.9582E+00	1.6031E-03	8.8448E-02	1.0643E-02	1.4466E-01	1.6791E-02	-1.1407E-02	5.8512E-04
7.229	2.0046E-02	2.1728E-01	1.9635E+00	1.5950E-03	8.8576E-02	1.0515E-02	1.4383E-01	1.6791E-02	-1.1296E-02	5.8118E-04
7.437	2.0030E-02	2.1528E-01	1.9651E+00	1.5853E-03	8.8563E-02	1.0395E-02	1.4263E-01	1.6789E-02	-1.1181E-02	5.7675E-04
7.644	2.0044E-02	2.1343E-01	1.9642E+00	1.5747E-03	8.8500E-02	1.0277E-02	1.4121E-01	1.6799E-02	-1.1068E-02	5.7131E-04
7.852	2.0012E-02	2.0774E-01	1.9597E+00	1.5429E-03	8.8332E-02	1.0115E-02	1.3987E-01	1.6917E-02	-1.0696E-02	5.5380E-04
8.059	1.9890E-02	2.0276E-01	1.9521E+00	1.5123E-03	8.7980E-02	9.9894E-03	1.3880E-01	1.7116E-02	-1.0356E-02	5.3474E-04
8.267	1.9817E-02	1.9805E-01	1.9447E+00	1.4828E-03	8.7751E-02	9.8689E-03	1.3823E-01	1.7285E-02	-1.0036E-02	5.1632E-04
8.475	1.9716E-02	1.9363E-01	1.9355E+00	1.4540E-03	8.7433E-02	9.7547E-03	1.3748E-01	1.7433E-02	-9.7316E-03	4.9760E-04
8.682	1.9622E-02	1.9046E-01	1.9265E+00	1.4282E-03	8.7120E-02	9.6897E-03	1.3647E-01	1.7731E-02	-9.4828E-03	4.7100E-04
8.890	1.9528E-02	1.8811E-01	1.9168E+00	1.4002E-03	8.6780E-02	9.6207E-03	1.3540E-01	1.8067E-02	-9.2296E-03	4.1476E-04
9.098	1.9454E-02	1.8587E-01	1.9074E+00	1.4003E-03	8.6465E-02	9.4389E-03	1.3401E-01	1.8739E-02	-9.1924E-03	4.2309E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.208	7.1185E-02	4.7744E-02	4.5491E+00	2.7368E-04	2.2331E-01	1.5503E-03	2.4638E-01	1.9185E-03	-3.3168E-03	1.0843E-04
1.416	7.7652E-02	1.0067E-01	4.8472E+00	5.6813E-04	2.4060E-01	3.3190E-03	2.6251E-01	4.2304E-03	-6.9326E-03	2.1967E-04
1.623	8.2919E-02	1.8599E-01	5.0528E+00	1.0298E-03	2.5361E-01	6.2710E-03	2.7395E-01	8.2698E-03	-1.2667E-02	3.8759E-04
1.831	8.7149E-02	3.0713E-01	5.1806E+00	1.6629E-03	2.6295E-01	1.0675E-02	2.8153E-01	1.4581E-02	-2.0634E-02	6.0957E-04
2.039	9.0471E-02	4.5944E-01	5.2427E+00	2.4261E-03	2.6916E-01	1.6583E-02	2.8589E-01	2.3389E-02	-3.0389E-02	8.7075E-04
2.246	9.2993E-02	6.3014E-01	5.2491E+00	3.2411E-03	2.7268E-01	2.3744E-02	2.8754E-01	3.4333E-02	-4.0990E-02	1.1504E-03
2.454	9.4801E-02	8.0229E-01	5.2083E+00	4.0205E-03	2.7388E-01	3.1628E-02	2.8691E-01	4.6440E-02	-5.1323E-02	1.4302E-03
2.662	9.5970E-02	9.6045E-01	5.1277E+00	4.6967E-03	2.7307E-01	3.9577E-02	2.8433E-01	5.8426E-02	-6.0485E-02	1.6975E-03
2.869	9.6564E-02	1.0945E+00	5.0139E+00	5.2353E-03	2.7055E-01	4.6996E-02	2.8009E-01	6.9138E-02	-6.7972E-02	1.9441E-03
3.077	9.6640E-02	1.2004E+00	4.8724E+00	5.6308E-03	2.6656E-01	5.3475E-02	2.7446E-01	7.7843E-02	-7.3659E-02	2.1635E-03
3.284	9.6249E-02	1.2784E+00	4.7081E+00	5.8960E-03	2.6132E-01	5.8818E-02	2.6764E-01	8.4279E-02	-7.7669E-02	2.3507E-03
3.492	9.5437E-02	1.3317E+00	4.5246E+00	6.0511E-03	2.5503E-01	6.2995E-02	2.5985E-01	8.8536E-02	-8.0241E-02	2.5022E-03
3.700	9.4191E-02	1.3642E+00	4.3293E+00	6.1174E-03	2.4784E-01	6.6086E-02	2.5119E-01	9.0892E-02	-8.1635E-02	2.6169E-03
3.907	9.2556E-02	1.3797E+00	4.1398E+00	6.1137E-03	2.4007E-01	6.8220E-02	2.4211E-01	9.1690E-02	-8.2091E-02	2.6954E-03
4.115	9.0675E-02	1.3817E+00	3.9581E+00	6.0552E-03	2.3195E-01	6.9538E-02	2.3230E-01	9.1264E-02	-8.1803E-02	2.7395E-03
4.322	8.8688E-02	1.3729E+00	3.7912E+00	5.9534E-03	2.2399E-01	7.0177E-02	2.2238E-01	8.9910E-02	-8.0921E-02	2.7517E-03
4.530	8.6764E-02	1.3513E+00	3.6447E+00	5.8113E-03	2.1681E-01	7.0209E-02	2.1536E-01	8.8201E-02	-7.9419E-02	2.7207E-03
4.738	8.4753E-02	1.3248E+00	3.5061E+00	5.6624E-03	2.0958E-01	6.9801E-02	2.0819E-01	8.5920E-02	-7.7738E-02	2.6778E-03
4.945	8.2956E-02	1.2947E+00	3.3875E+00	5.5111E-03	2.0367E-01	6.8994E-02	2.0346E-01	8.3336E-02	-7.5944E-02	2.6216E-03
5.153	8.1213E-02	1.2624E+00	3.2766E+00	5.3656E-03	1.9792E-01	6.7907E-02	1.9829E-01	8.0457E-02	-7.4144E-02	2.5667E-03
5.361	7.9591E-02	1.2304E+00	3.1768E+00	5.2312E-03	1.9292E-01	6.6649E-02	1.9454E-01	7.7426E-02	-7.2441E-02	2.5237E-03
5.568	7.8010E-02	1.1994E+00	3.0818E+00	5.1046E-03	1.8809E-01	6.5309E-02	1.9079E-01	7.4251E-02	-7.0827E-02	2.4815E-03
5.776	7.6475E-02	1.1693E+00	2.9926E+00	4.9849E-03	1.8342E-01	6.3906E-02	1.8701E-01	7.0973E-02	-6.9294E-02	2.4398E-03
5.983	7.4929E-02	1.1404E+00	2.9047E+00	4.8688E-03	1.7884E-01	6.2434E-02	1.8361E-01	6.8231E-02	-6.7808E-02	2.3833E-03
6.191	7.3391E-02	1.1128E+00	2.8211E+00	4.7597E-03	1.7465E-01	6.0964E-02	1.8133E-01	6.5459E-02	-6.6408E-02	2.3301E-03
6.399	7.1780E-02	1.0831E+00	2.7373E+00	4.6345E-03	1.7024E-01	5.9489E-02	1.8061E-01	6.2738E-02	-6.4776E-02	2.2718E-03
6.606	7.0272E-02	1.0546E+00	2.6574E+00	4.5075E-03	1.6604E-01	5.8132E-02	1.8000E-01	6.0706E-02	-6.3111E-02	2.1941E-03
6.814	6.8846E-02	1.0276E+00	2.5825E+00	4.3876E-03	1.6208E-01	5.6810E-02	1.7924E-01	5.8720E-02	-6.1539E-02	2.1191E-03
7.021	6.7320E-02	1.0017E+00	2.5091E+00	4.2727E-03	1.5802E-01	5.5516E-02	1.7929E-01	5.6755E-02	-6.0025E-02	2.0495E-03
7.229	6.5853E-02	9.7695E-01	2.4304E+00	4.1638E-03	1.5410E-01	5.4250E-02	1.7860E-01	5.4828E-02	-5.8588E-02	1.9815E-03
7.437	6.4027E-02	9.5328E-01	2.3339E+00	4.0602E-03	1.4874E-01	5.3002E-02	1.7086E-01	5.2921E-02	-5.7221E-02	1.9145E-03
7.644	6.2013E-02	9.3213E-01	2.2406E+00	3.9606E-03	1.4336E-01	5.2007E-02	1.6417E-01	5.1654E-02	-5.5896E-02	1.8507E-03
7.852	6.0079E-02	8.8664E-01	2.1466E+00	3.6826E-03	1.3816E-01	5.0882E-02	1.5840E-01	5.2398E-02	-5.2397E-02	1.6302E-03
8.059	5.8419E-02	8.4121E-01	2.0592E+00	3.4159E-03	1.3339E-01	4.9625E-02	1.5221E-01	5.2527E-02	-4.9014E-02	1.4262E-03
8.267	5.5981E-02	7.9800E-01	1.9357E+00	3.1603E-03	1.2463E-01	4.8407E-02	1.3322E-01	5.2720E-02	-4.5771E-02	1.2204E-03
8.475	5.4044E-02	7.5653E-01	1.8377E+00	2.9128E-03	1.1829E-01	4.7191E-02	1.2137E-01	5.2969E-02	-4.2626E-02	1.0025E-03
8.682	5.2203E-02	7.1098E-01	1.7463E+00	2.6518E-03	1.1262E-01	4.5683E-02	1.1201E-01	5.2531E-02	-3.9265E-02	7.6128E-04
8.890	5.0411E-02	6.5888E-01	1.6588E+00	2.3374E-03	1.0722E-01	4.3633E-02	1.0339E-01	5.3093E-02	-3.5107E-02	2.9115E-04
9.098	4.8450E-02	6.1396E-01	1.5679E+00	2.3862E-03	1.0157E-01	4.4686E-02	9.5210E-02	4.5189E-02	-3.5440E-02	2.0390E-03

TEST 2700

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    9.0000
BEAM AT MIDSHIP=    2.4512

DISPLACED VOLUME/(L/2)**3=    .580977E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=    .101490E+01
VERTICAL CENTER OF BOYANCY/L=  -.230302E-01
METACENTER HEIGHT OVER WATE-PLANE/L=    .101340E+00
HEAVE-HEAVE RESTORING COEFFICIENT=    .277498E+02
HEAVE-PITCH RESTORING COEFFICIENT=    .172574E+01
PITCH-PITCH RESTORING COEFFICIENT=    .177857E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=    .460000E+00
TOTAL MASS=     .0046
(ROLL-RADIUS OF GYRATION/L)**2=    .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=    .188800E+00
(YAW-RADIUS OF GYRATION/L)**2=    .188800E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 39).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FRECUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.091	6.4274E-02	6.9633E-01	3.7077E+00	5.6190E-03	2.3433E-01	3.4033E-02	3.8448E-01	6.2676E-02	-4.2736E-02	2.7584E-03
1.278	5.6772E-02	7.1975E-01	3.3194E+00	5.7694E-03	2.0668E-01	3.5104E-02	3.4395E-01	6.4720E-02	-4.4255E-02	2.8318E-03
1.465	5.0817E-02	7.3987E-01	2.9587E+00	5.8841E-03	1.8520E-01	3.6123E-02	3.1319E-01	6.6796E-02	-4.5471E-02	2.8811E-03
1.652	4.6017E-02	7.5169E-01	2.6775E+00	5.9288E-03	1.6827E-01	3.6905E-02	2.8947E-01	6.8541E-02	-4.6040E-02	2.8905E-03
1.839	4.2102E-02	7.5048E-01	2.4565E+00	5.8767E-03	1.5480E-01	3.7243E-02	2.7099E-01	6.9483E-02	-4.5676E-02	2.8515E-03
2.025	3.8881E-02	7.3356E-01	2.2820E+00	5.7190E-03	1.4401E-01	3.6974E-02	2.5648E-01	6.9174E-02	-4.4259E-02	2.7658E-03
2.212	3.6213E-02	7.0142E-01	2.1443E+00	5.4691E-03	1.3533E-01	3.6026E-02	2.4503E-01	6.7368E-02	-4.1896E-02	2.6438E-03
2.399	3.3994E-02	6.5753E-01	2.0360E+00	5.1561E-03	1.2835E-01	3.4456E-02	2.3599E-01	6.4139E-02	-3.8867E-02	2.4989E-03
2.586	3.2144E-02	6.0693E-01	1.9516E+00	4.8139E-03	1.2275E-01	3.2421E-02	2.2888E-01	5.9848E-02	-3.5515E-02	2.3434E-03
2.773	3.0602E-02	5.5455E-01	1.8867E+00	4.4717E-03	1.1828E-01	3.0123E-02	2.2331E-01	5.4992E-02	-3.2144E-02	2.1860E-03
2.960	2.9320E-02	5.0417E-01	1.8377E+00	4.1496E-03	1.1474E-01	2.7756E-02	2.1900E-01	5.0045E-02	-2.8963E-02	2.0330E-03
3.147	2.8258E-02	4.5808E-01	1.8018E+00	3.8585E-03	1.1198E-01	2.5470E-02	2.1572E-01	4.5360E-02	-2.6088E-02	1.8883E-03
3.333	2.7384E-02	4.1737E-01	1.7765E+00	3.6028E-03	1.0987E-01	2.3360E-02	2.1327E-01	4.1150E-02	-2.3564E-02	1.7544E-03
3.520	2.6695E-02	3.8224E-01	1.7733E+00	3.3824E-03	1.0833E-01	2.1472E-02	2.1230E-01	3.7503E-02	-2.1389E-02	1.6325E-03
3.707	2.6215E-02	3.5241E-01	1.8111E+00	3.1949E-03	1.0754E-01	1.9819E-02	2.1184E-01	3.4426E-02	-1.9537E-02	1.5231E-03
3.894	2.5997E-02	3.2735E-01	1.8675E+00	3.0367E-03	1.0791E-01	1.8392E-02	2.1520E-01	3.1876E-02	-1.7973E-02	1.4260E-03
4.081	2.5824E-02	3.0645E-01	1.9127E+00	2.9040E-03	1.0838E-01	1.7171E-02	2.1745E-01	2.9792E-02	-1.6658E-02	1.3404E-03
4.268	2.5775E-02	2.9065E-01	1.9550E+00	2.8192E-03	1.0937E-01	1.6146E-02	2.2150E-01	2.7985E-02	-1.5723E-02	1.2791E-03
4.455	2.5961E-02	2.7799E-01	1.9962E+00	2.7515E-03	1.1112E-01	1.5278E-02	2.2633E-01	2.6545E-02	-1.4971E-02	1.2242E-03
4.641	2.6088E-02	2.6848E-01	2.0261E+00	2.7194E-03	1.1249E-01	1.4565E-02	2.3022E-01	2.5386E-02	-1.4453E-02	1.1890E-03
4.828	2.6169E-02	2.6148E-01	2.0469E+00	2.7139E-03	1.1357E-01	1.3982E-02	2.3333E-01	2.4572E-02	-1.4096E-02	1.1659E-03
5.015	2.6414E-02	2.5582E-01	2.0664E+00	2.7035E-03	1.1516E-01	1.3507E-02	2.3757E-01	2.4058E-02	-1.3766E-02	1.1403E-03
5.202	2.6576E-02	2.5061E-01	2.0786E+00	2.6846E-03	1.1638E-01	1.3092E-02	2.4092E-01	2.3711E-02	-1.3418E-02	1.1044E-03
5.389	2.6677E-02	2.4591E-01	2.0885E+00	2.6627E-03	1.1729E-01	1.2739E-02	2.4356E-01	2.3478E-02	-1.3088E-02	1.0701E-03
5.576	2.6730E-02	2.4187E-01	2.0966E+00	2.6385E-03	1.1794E-01	1.2454E-02	2.4543E-01	2.3395E-02	-1.2772E-02	1.0377E-03
5.762	2.6746E-02	2.3809E-01	2.1032E+00	2.6125E-03	1.1841E-01	1.2209E-02	2.4650E-01	2.3362E-02	-1.2470E-02	1.0071E-03
5.949	2.6749E-02	2.3458E-01	2.1093E+00	2.5853E-03	1.1882E-01	1.2000E-02	2.4654E-01	2.3376E-02	-1.2182E-02	9.7793E-04
6.136	2.6730E-02	2.3137E-01	2.1129E+00	2.5571E-03	1.1913E-01	1.1829E-02	2.4604E-01	2.3453E-02	-1.1901E-02	9.5192E-04
6.323	2.6743E-02	2.2871E-01	2.1177E+00	2.5311E-03	1.1953E-01	1.1688E-02	2.4554E-01	2.3563E-02	-1.1654E-02	9.2865E-04
6.510	2.6741E-02	2.2619E-01	2.1200E+00	2.5055E-03	1.1985E-01	1.1554E-02	2.4500E-01	2.3652E-02	-1.1426E-02	9.0620E-04
6.697	2.6764E-02	2.2389E-01	2.1214E+00	2.4800E-03	1.2013E-01	1.1427E-02	2.4409E-01	2.3738E-02	-1.1216E-02	8.8393E-04
6.884	2.6767E-02	2.2155E-01	2.1202E+00	2.4540E-03	1.2030E-01	1.1306E-02	2.4302E-01	2.3802E-02	-1.1012E-02	8.6279E-04
7.070	2.6746E-02	2.1966E-01	2.1162E+00	2.4286E-03	1.2038E-01	1.1201E-02	2.4182E-01	2.3912E-02	-1.0833E-02	8.3976E-04
7.257	2.6786E-02	2.1827E-01	2.1106E+00	2.4037E-03	1.2043E-01	1.1120E-02	2.4036E-01	2.4103E-02	-1.0675E-02	8.1442E-04
7.444	2.6816E-02	2.1743E-01	2.1036E+00	2.3791E-03	1.2042E-01	1.1074E-02	2.3879E-01	2.4406E-02	-1.0537E-02	7.8646E-04
7.631	2.6842E-02	2.1795E-01	2.0954E+00	2.3695E-03	1.2034E-01	1.1093E-02	2.3708E-01	2.4487E-02	-1.0554E-02	7.8738E-04
7.818	2.6881E-02	2.1886E-01	2.0882E+00	2.3606E-03	1.2024E-01	1.1149E-02	2.3506E-01	2.4624E-02	-1.0590E-02	7.8728E-04
8.005	2.6725E-02	2.1873E-01	2.0790E+00	2.3445E-03	1.1983E-01	1.1224E-02	2.3353E-01	2.4879E-02	-1.0559E-02	7.7218E-04
8.191	2.6418E-02	2.1536E-01	2.0671E+00	2.3323E-03	1.1896E-01	1.1093E-02	2.3238E-01	2.4026E-02	-1.0408E-02	8.0258E-04

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.091	7.2365E-02	3.6129E-02	4.5789E+00	2.8978E-04	2.6976E-01	1.3358E-03	4.0969E-01	2.0590E-03	-2.6718E-03	1.7098E-04
1.278	7.8869E-02	7.6800E-02	4.8984E+00	6.0397E-04	2.9034E-01	2.8677E-03	4.3601E-01	4.5553E-03	-5.6195E-03	3.4933E-04
1.465	8.4133E-02	1.4394E-01	5.1280E+00	1.1062E-03	3.0588E-01	5.4531E-03	4.5471E-01	8.9702E-03	-1.0396E-02	6.2464E-04
1.652	8.8325E-02	2.4269E-01	5.2818E+00	1.8179E-03	3.1716E-01	9.3793E-03	4.6719E-01	1.6011E-02	-1.7262E-02	9.9954E-04
1.839	9.1585E-02	3.7274E-01	5.3712E+00	2.7182E-03	3.2481E-01	1.4779E-02	4.7456E-01	2.6136E-02	-2.6069E-02	1.4552E-03
2.025	9.4029E-02	5.2656E-01	5.4059E+00	3.7402E-03	3.2937E-01	2.1521E-02	4.7766E-01	3.9223E-02	-3.6196E-02	1.9562E-03
2.212	9.5754E-02	6.9076E-01	5.3938E+00	4.7896E-03	3.3127E-01	2.9191E-02	4.7719E-01	5.4395E-02	-4.6702E-02	2.4636E-03
2.399	9.6843E-02	8.5016E-01	5.3420E+00	5.7739E-03	3.3088E-01	3.7175E-02	4.7371E-01	7.0205E-02	-5.6636E-02	2.9463E-03
2.586	9.7366E-02	9.9228E-01	5.2563E+00	6.6272E-03	3.2853E-01	4.4839E-02	4.6770E-01	8.5109E-02	-6.5297E-02	3.3843E-03
2.773	9.7387E-02	1.1098E+00	5.1423E+00	7.3171E-03	3.2450E-01	5.1680E-02	4.5954E-01	9.7905E-02	-7.2338E-02	3.7668E-03
2.960	9.6961E-02	1.2005E+00	5.0045E+00	7.8392E-03	3.1903E-01	5.7404E-02	4.4959E-01	1.0795E-01	-7.7713E-02	4.0887E-03
3.147	9.6139E-02	1.2657E+00	4.8470E+00	8.2068E-03	3.1235E-01	6.1919E-02	4.3814E-01	1.1513E-01	-8.1559E-02	4.3486E-03
3.333	9.4966E-02	1.3088E+00	4.6728E+00	8.4408E-03	3.0465E-01	6.5280E-02	4.2546E-01	1.1968E-01	-8.4094E-02	4.5480E-03
3.520	9.3486E-02	1.3335E+00	4.4842E+00	8.5638E-03	2.9609E-01	6.7621E-02	4.1177E-01	1.2201E-01	-8.5551E-02	4.6900E-03
3.707	9.1654E-02	1.3434E+00	4.2987E+00	8.5963E-03	2.8690E-01	6.9107E-02	3.9721E-01	1.2259E-01	-8.6137E-02	4.7793E-03
3.894	8.9729E-02	1.3419E+00	4.1404E+00	8.5560E-03	2.7819E-01	6.9896E-02	3.8632E-01	1.2183E-01	-8.6024E-02	4.8205E-03
4.081	8.7625E-02	1.3313E+00	3.9893E+00	8.4565E-03	2.6930E-01	7.0124E-02	3.7425E-01	1.2008E-01	-8.5347E-02	4.8183E-03
4.268	8.5486E-02	1.3111E+00	3.8532E+00	8.3009E-03	2.6087E-01	6.9885E-02	3.6440E-01	1.1780E-01	-8.4058E-02	4.7648E-03
4.455	8.3451E-02	1.2860E+00	3.7314E+00	8.1166E-03	2.5318E-01	6.9292E-02	3.5501E-01	1.1493E-01	-8.2489E-02	4.6838E-03
4.641	8.1408E-02	1.2581E+00	3.6162E+00	7.9524E-03	2.4558E-01	6.8448E-02	3.4540E-01	1.1147E-01	-8.0949E-02	4.6272E-03
4.828	7.9357E-02	1.2297E+00	3.5068E+00	7.8358E-03	2.3808E-01	6.7454E-02	3.3564E-01	1.0744E-01	-7.9687E-02	4.6475E-03
5.015	7.7567E-02	1.2015E+00	3.4102E+00	7.7191E-03	2.3165E-01	6.6334E-02	3.2793E-01	1.0320E-01	-7.8445E-02	4.6647E-03
5.202	7.5844E-02	1.1719E+00	3.3191E+00	7.5641E-03	2.2543E-01	6.4870E-02	3.2024E-01	9.9511E-02	-7.6918E-02	4.5607E-03
5.389	7.4177E-02	1.1429E+00	3.2320E+00	7.4155E-03	2.1939E-01	6.3352E-02	3.1257E-01	9.5641E-02	-7.5462E-02	4.4651E-03
5.576	7.2557E-02	1.1159E+00	3.1476E+00	7.2736E-03	2.1351E-01	6.1876E-02	3.0503E-01	9.1967E-02	-7.4082E-02	4.3738E-03
5.762	7.0970E-02	1.0898E+00	3.0651E+00	7.1373E-03	2.0778E-01	6.0379E-02	2.9774E-01	8.8228E-02	-7.2768E-02	4.2871E-03
5.949	6.9330E-02	1.0642E+00	2.9795E+00	7.0063E-03	2.0186E-01	5.8855E-02	2.9195E-01	8.4397E-02	-7.1510E-02	4.2050E-03
6.136	6.7694E-02	1.0414E+00	2.8945E+00	6.8805E-03	1.9598E-01	5.7497E-02	2.8671E-01	8.1131E-02	-7.0315E-02	4.1236E-03
6.323	6.5626E-02	1.0198E+00	2.7840E+00	6.7537E-03	1.8818E-01	5.6272E-02	2.7460E-01	7.8260E-02	-6.9095E-02	4.0441E-03
6.510	6.3667E-02	9.9947E-01	2.6833E+00	6.6313E-03	1.8092E-01	5.5079E-02	2.6382E-01	7.5494E-02	-6.7925E-02	3.9642E-03
6.697	6.1614E-02	9.7996E-01	2.5878E+00	6.5117E-03	1.7370E-01	5.3914E-02	2.5344E-01	7.2811E-02	-6.6778E-02	3.8857E-03
6.884	5.9622E-02	9.6128E-01	2.4961E+00	6.3954E-03	1.6664E-01	5.2776E-02	2.4303E-01	7.0210E-02	-6.5677E-02	3.8053E-03
7.070	5.7581E-02	9.4116E-01	2.3819E+00	6.2764E-03	1.5965E-01	5.1613E-02	2.3235E-01	6.7367E-02	-6.4514E-02	3.7362E-03
7.257	5.5201E-02	9.1952E-01	2.2697E+00	6.1556E-03	1.5241E-01	5.0384E-02	2.2207E-01	6.4161E-02	-6.3306E-02	3.6772E-03
7.444	5.2832E-02	8.9576E-01	2.1598E+00	6.0322E-03	1.4502E-01	4.9011E-02	2.1139E-01	6.0378E-02	-6.2045E-02	3.6276E-03
7.631	5.0345E-02	8.6180E-01	2.0496E+00	5.7204E-03	1.3717E-01	4.7179E-02	2.0018E-01	5.8176E-02	-5.9566E-02	3.3374E-03
7.818	4.7333E-02	8.2055E-01	1.9265E+00	5.3548E-03	1.2799E-01	4.4887E-02	1.8914E-01	5.5317E-02	-5.6568E-02	2.9716E-03
8.005	4.0718E-02	7.3153E-01	1.7306E+00	4.9462E-03	1.1189E-01	4.1063E-02	1.9142E-01	4.3095E-02	-5.1747E-02	3.0238E-03
8.191	4.2183E-02	7.2203E-01	1.6512E+00	4.6769E-03	1.0396E-01	3.4374E-02	1.3328E-01	3.7105E-02	-5.0973E-02	2.0912E-03

TEST 2800

HYDROSTATICS

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LENGTH BETWEEN PERPENDICULARS=    8.4000
BEAM AT MIDSHIP=    2.3900

DISPLACED VOLUME/(L/2)**3=   .715436E-01
LONGITUDINAL CENTER OF BOYANCY/(L/2)=   .984698E+00
VERTICAL CENTER OF BOYANCY/L=  -.272319E-01
METACENTER HEIGHT OVER WATE-PLANE/L=   .932632E-01
HEAVE-HEAVE RESTORING COEFFICIENT=   .237270E+02
HEAVE-PITCH RESTORING COEFFICIENT=  -.179940E+01
PITCH-PITCH RESTORING COEFFICIENT=   .153539E+01
DISTANCE OF CENTER OF GRAVITY FROM THE FORWARD MOST STATION=  0.
Z-COORDINATE OF THE C.G.=   .410000E+00
TOTAL MASS=      .0046
(ROLL-RADIUS OF GYRATION/L)**2=   .160000E+00
(PITCH-RADIUS OF GYRATION/L)**2=   .183000E+00
(YAW-RADIUS OF GYRATION/L)**2=   .183000E+00
CENTRIFUGAL MOMENT YAW-ROLL/MASS/L**2=  0.
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ADDED MASS MATRIX

NON-DIMENSIONAL, SPEED INDEPENDENT ADDED MASS AND DAMPING COEFFICIENTS FOR THE SPECIFIED FREQUENCIES (NFR= 40).

IRR= 2 .   IF IRR=2 INTERPOLATION OF IRREGULAR FREQUENCIES IS PERFORMED. IF IRR=1 INTERPOLATION IS NOT PERFORMED.

NON-DIMENSIONALIZED ADDED MASS COEFFICIENTS-

WE(ND)	A(1,1)	A(2,2)	A(3,3)	A(4,4)	A(5,5)	A(6,6)	A(3,5)	A(2,6)	A(2,4)	A(4,6)
1.054	8.0076E-02	8.1874E-01	3.4264E+00	5.6035E-03	2.1758E-01	4.2363E-02	-4.1121E-01	-8.8519E-02	-3.7181E-02	-4.5821E-03
1.228	7.0909E-02	8.4814E-01	3.0127E+00	5.7449E-03	1.9274E-01	4.3790E-02	-3.6890E-01	-9.1781E-02	-3.8553E-02	-4.7070E-03
1.402	6.3559E-02	8.7407E-01	2.6917E+00	5.8534E-03	1.7328E-01	4.5201E-02	-3.3629E-01	-9.5121E-02	-3.9629E-02	-4.8104E-03
1.577	5.7577E-02	8.9043E-01	2.4399E+00	5.8977E-03	1.5783E-01	4.6367E-02	-3.1078E-01	-9.7984E-02	-4.0093E-02	-4.8701E-03
1.751	5.2653E-02	8.9107E-01	2.2411E+00	5.8524E-03	1.4546E-01	4.7014E-02	-2.9060E-01	-9.9629E-02	-3.9684E-02	-4.8679E-03
1.925	4.8562E-02	8.7195E-01	2.0837E+00	5.7084E-03	1.3549E-01	4.6879E-02	-2.7450E-01	-9.9307E-02	-3.8298E-02	-4.7941E-03
2.099	4.5143E-02	8.3287E-01	1.9592E+00	5.4762E-03	1.2743E-01	4.5803E-02	-2.6157E-01	-9.6546E-02	-3.6049E-02	-4.6489E-03
2.273	4.2273E-02	7.7765E-01	1.8614E+00	5.1817E-03	1.2092E-01	4.3791E-02	-2.5115E-01	-9.1368E-02	-3.3215E-02	-4.4413E-03
2.447	3.9861E-02	7.1259E-01	1.7853E+00	4.8564E-03	1.1566E-01	4.1016E-02	-2.4276E-01	-8.4296E-02	-3.0127E-02	-4.1869E-03
2.621	3.7833E-02	6.4433E-01	1.7270E+00	4.5281E-03	1.1144E-01	3.7763E-02	-2.3600E-01	-7.6148E-02	-2.7064E-02	-3.9047E-03
2.795	3.6132E-02	5.7823E-01	1.6835E+00	4.2166E-03	1.0809E-01	3.4342E-02	-2.3059E-01	-6.7773E-02	-2.4210E-02	-3.6141E-03
2.969	3.4714E-02	5.1777E-01	1.6520E+00	3.9335E-03	1.0546E-01	3.1012E-02	-2.2628E-01	-5.9842E-02	-2.1654E-02	-3.3315E-03
3.143	3.3539E-02	4.6464E-01	1.6304E+00	3.6836E-03	1.0343E-01	2.7949E-02	-2.2290E-01	-5.2770E-02	-1.9422E-02	-3.0687E-03
3.317	3.2644E-02	4.1924E-01	1.6294E+00	3.4676E-03	1.0194E-01	2.5240E-02	-2.2101E-01	-4.6732E-02	-1.7502E-02	-2.8320E-03
3.491	3.2057E-02	3.8116E-01	1.6655E+00	3.2834E-03	1.0114E-01	2.2910E-02	-2.1955E-01	-4.1735E-02	-1.5865E-02	-2.6240E-03
3.665	3.1713E-02	3.4962E-01	1.7093E+00	3.1280E-03	1.0101E-01	2.0939E-02	-2.1987E-01	-3.7688E-02	-1.4479E-02	-2.4441E-03
3.839	3.1526E-02	3.2373E-01	1.7531E+00	2.9977E-03	1.0144E-01	1.9292E-02	-2.2153E-01	-3.4464E-02	-1.3310E-02	-2.2902E-03
4.013	3.1447E-02	3.0320E-01	1.7936E+00	2.8974E-03	1.0231E-01	1.7929E-02	-2.2484E-01	-3.1899E-02	-1.2386E-02	-2.1630E-03
4.187	3.1413E-02	2.8735E-01	1.8250E+00	2.8455E-03	1.0311E-01	1.6833E-02	-2.2724E-01	-2.9764E-02	-1.1746E-02	-2.0812E-03
4.361	3.1480E-02	2.7564E-01	1.8544E+00	2.8149E-03	1.0439E-01	1.5942E-02	-2.3122E-01	-2.8100E-02	-1.1299E-02	-2.0164E-03
4.535	3.1517E-02	2.6653E-01	1.8754E+00	2.7898E-03	1.0540E-01	1.5215E-02	-2.3440E-01	-2.6861E-02	-1.0934E-02	-1.9595E-03
4.709	3.1657E-02	2.6001E-01	1.8951E+00	2.7761E-03	1.0689E-01	1.4637E-02	-2.3881E-01	-2.6108E-02	-1.0643E-02	-1.9092E-03
4.883	3.1805E-02	2.5448E-01	1.9085E+00	2.7568E-03	1.0810E-01	1.4124E-02	-2.4213E-01	-2.5856E-02	-1.0280E-02	-1.8329E-03
5.057	3.1895E-02	2.4962E-01	1.9163E+00	2.7347E-03	1.0904E-01	1.3702E-02	-2.4470E-01	-2.5749E-02	-9.9331E-03	-1.7653E-03
5.231	3.1963E-02	2.4534E-01	1.9266E+00	2.7104E-03	1.0974E-01	1.3357E-02	-2.4653E-01	-2.5760E-02	-9.6022E-03	-1.7052E-03
5.405	3.1990E-02	2.4174E-01	1.9323E+00	2.6844E-03	1.1025E-01	1.3088E-02	-2.4786E-01	-2.5911E-02	-9.2816E-03	-1.6527E-03
5.579	3.2067E-02	2.3844E-01	1.9395E+00	2.6572E-03	1.1086E-01	1.2865E-02	-2.4851E-01	-2.6107E-02	-8.9761E-03	-1.6057E-03
5.753	3.2160E-02	2.3574E-01	1.9471E+00	2.6331E-03	1.1136E-01	1.2684E-02	-2.4808E-01	-2.6319E-02	-8.7123E-03	-1.5648E-03
5.927	3.2271E-02	2.3331E-01	1.9517E+00	2.6080E-03	1.1173E-01	1.2544E-02	-2.4712E-01	-2.6585E-02	-8.4526E-03	-1.5297E-03
6.101	3.2345E-02	2.3121E-01	1.9538E+00	2.5842E-03	1.1198E-01	1.2424E-02	-2.4575E-01	-2.6841E-02	-8.2220E-03	-1.4975E-03
6.275	3.2396E-02	2.2954E-01	1.9537E+00	2.5615E-03	1.1208E-01	1.2321E-02	-2.4424E-01	-2.7103E-02	-8.0223E-03	-1.4670E-03
6.449	3.2433E-02	2.2806E-01	1.9527E+00	2.5385E-03	1.1208E-01	1.2234E-02	-2.4271E-01	-2.7374E-02	-7.8354E-03	-1.4381E-03
6.623	3.2457E-02	2.2614E-01	1.9512E+00	2.5149E-03	1.1199E-01	1.2110E-02	-2.4114E-01	-2.7485E-02	-7.6503E-03	-1.4124E-03
6.798	3.2463E-02	2.2405E-01	1.9487E+00	2.4903E-03	1.1182E-01	1.1992E-02	-2.3945E-01	-2.7557E-02	-7.4608E-03	-1.3894E-03
6.972	3.2486E-02	2.2246E-01	1.9446E+00	2.4655E-03	1.1160E-01	1.1899E-02	-2.3757E-01	-2.7709E-02	-7.2874E-03	-1.3653E-03
7.146	3.2491E-02	2.2137E-01	1.9389E+00	2.4403E-03	1.1132E-01	1.1844E-02	-2.3563E-01	-2.7970E-02	-7.1237E-03	-1.3405E-03
7.320	3.2492E-02	2.2028E-01	1.9333E+00	2.4144E-03	1.1100E-01	1.1794E-02	-2.3357E-01	-2.8215E-02	-6.9631E-03	-1.3153E-03
7.494	3.2488E-02	2.2018E-01	1.9268E+00	2.3992E-03	1.1063E-01	1.1814E-02	-2.3144E-01	-2.8214E-02	-6.9223E-03	-1.3185E-03
7.668	2.9387E-02	2.1956E-01	1.8257E+00	2.2291E-03	9.0592E-02	1.1732E-02	-1.8628E-01	-2.8746E-02	-6.6712E-03	-1.2378E-03
7.842	2.9422E-02	2.2003E-01	1.8201E+00	2.1905E-03	9.0116E-02	1.1783E-02	-1.8365E-01	-2.9035E-02	-6.4869E-03	-1.1752E-03

DAMPING COEFFICIENT MATRIX

NON-DIMENSIONALIZED DAMPING COEFFICIENTS-

WE(ND)	B(1,1)	B(2,2)	B(3,3)	B(4,4)	B(5,5)	B(6,6)	B(3,5)	B(2,6)	B(2,4)	B(4,6)
1.054	8.8150E-02	4.3601E-02	4.0199E+00	2.7785E-04	2.4148E-01	1.6310E-03	-4.2532E-01	-3.2296E-03	-2.5332E-03	-2.2589E-04
1.228	9.5894E-02	9.1164E-02	4.2854E+00	5.6564E-04	2.5923E-01	3.4543E-03	-4.5330E-01	-7.0145E-03	-5.2044E-03	-4.5765E-04
1.402	1.0224E-01	1.6953E-01	4.4752E+00	1.0201E-03	2.7272E-01	6.5443E-03	-4.7404E-01	-1.3663E-02	-9.4717E-03	-8.2250E-04
1.577	1.0736E-01	2.8535E-01	4.6005E+00	1.6603E-03	2.8258E-01	1.1300E-02	-4.8881E-01	-2.4258E-02	-1.5543E-02	-1.3390E-03
1.751	1.1140E-01	4.3936E-01	4.6707E+00	2.4697E-03	2.8934E-01	1.7975E-02	-4.9862E-01	-3.9562E-02	-2.3262E-02	-2.0042E-03
1.925	1.1450E-01	6.2370E-01	4.6937E+00	3.3915E-03	2.9344E-01	2.6521E-02	-5.0426E-01	-5.9509E-02	-3.2050E-02	-2.7911E-03
2.099	1.1674E-01	8.2274E-01	4.6761E+00	4.3431E-03	2.9523E-01	3.6494E-02	-5.0636E-01	-8.2880E-02	-4.1060E-02	-3.6539E-03
2.273	1.1821E-01	1.0176E+00	4.6240E+00	5.2420E-03	2.9504E-01	4.7111E-02	-5.0545E-01	-1.0748E-01	-4.9453E-02	-4.5362E-03
2.447	1.1900E-01	1.1917E+00	4.5425E+00	6.0266E-03	2.9314E-01	5.7447E-02	-5.0196E-01	-1.3077E-01	-5.6654E-02	-5.3805E-03
2.621	1.1917E-01	1.3348E+00	4.4364E+00	6.6651E-03	2.8977E-01	6.6686E-02	-4.9624E-01	-1.5065E-01	-6.2418E-02	-6.1374E-03
2.795	1.1878E-01	1.4431E+00	4.3097E+00	7.1511E-03	2.8514E-01	7.4296E-02	-4.8861E-01	-1.6591E-01	-6.6763E-02	-6.7726E-03
2.969	1.1788E-01	1.5181E+00	4.1662E+00	7.4946E-03	2.7946E-01	8.0078E-02	-4.7934E-01	-1.7627E-01	-6.9849E-02	-7.2708E-03
3.143	1.1654E-01	1.5642E+00	4.0086E+00	7.7139E-03	2.7289E-01	8.4107E-02	-4.6866E-01	-1.8215E-01	-7.1881E-02	-7.6331E-03
3.317	1.1483E-01	1.5867E+00	3.8396E+00	7.8291E-03	2.6557E-01	8.6616E-02	-4.5682E-01	-1.8433E-01	-7.3058E-02	-7.8715E-03
3.491	1.1267E-01	1.5911E+00	3.6742E+00	7.8597E-03	2.5771E-01	8.7893E-02	-4.4369E-01	-1.8369E-01	-7.3544E-02	-8.0032E-03
3.665	1.1022E-01	1.5815E+00	3.5172E+00	7.8222E-03	2.4958E-01	8.8211E-02	-4.3010E-01	-1.8100E-01	-7.3475E-02	-8.0461E-03
3.839	1.0767E-01	1.5616E+00	3.3822E+00	7.7299E-03	2.4197E-01	8.7798E-02	-4.1868E-01	-1.7687E-01	-7.2951E-02	-8.0159E-03
4.013	1.0515E-01	1.5328E+00	3.2677E+00	7.5919E-03	2.3520E-01	8.6831E-02	-4.1064E-01	-1.7185E-01	-7.2008E-02	-7.9235E-03
4.187	1.0255E-01	1.4969E+00	3.1588E+00	7.4194E-03	2.2841E-01	8.5396E-02	-4.0165E-01	-1.6651E-01	-7.0713E-02	-7.7703E-03
4.361	1.0002E-01	1.4570E+00	3.0597E+00	7.2360E-03	2.2206E-01	8.3673E-02	-3.9382E-01	-1.6071E-01	-6.9285E-02	-7.5939E-03
4.535	9.7470E-02	1.4156E+00	2.9653E+00	7.0493E-03	2.1573E-01	8.1753E-02	-3.8575E-01	-1.5455E-01	-6.7843E-02	-7.4021E-03
4.709	9.5019E-02	1.3752E+00	2.8796E+00	6.8988E-03	2.1000E-01	7.9755E-02	-3.7913E-01	-1.4804E-01	-6.6633E-02	-7.2533E-03
4.883	9.2663E-02	1.3355E+00	2.7991E+00	6.8294E-03	2.0447E-01	7.7637E-02	-3.7233E-01	-1.4170E-01	-6.5697E-02	-7.1840E-03
5.057	9.0379E-02	1.2972E+00	2.7226E+00	6.7608E-03	1.9905E-01	7.5508E-02	-3.6554E-01	-1.3537E-01	-6.4811E-02	-7.1136E-03
5.231	8.8151E-02	1.2603E+00	2.6476E+00	6.6929E-03	1.9375E-01	7.3383E-02	-3.5880E-01	-1.2910E-01	-6.3967E-02	-7.0430E-03
5.405	8.5985E-02	1.2257E+00	2.5762E+00	6.6259E-03	1.8855E-01	7.1338E-02	-3.5206E-01	-1.2317E-01	-6.3153E-02	-6.9744E-03
5.579	8.4804E-02	1.1927E+00	2.5398E+00	6.5597E-03	1.9024E-01	6.9331E-02	-3.6428E-01	-1.1739E-01	-6.2376E-02	-6.9051E-03
5.753	8.3608E-02	1.1604E+00	2.5079E+00	6.4907E-03	1.9174E-01	6.7363E-02	-3.7537E-01	-1.1179E-01	-6.1570E-02	-6.8315E-03
5.927	8.2207E-02	1.1305E+00	2.4761E+00	6.4226E-03	1.9293E-01	6.5530E-02	-3.8603E-01	-1.0667E-01	-6.0777E-02	-6.7631E-03
6.101	8.0879E-02	1.1018E+00	2.4473E+00	6.3534E-03	1.9404E-01	6.3754E-02	-3.9560E-01	-1.0175E-01	-5.9979E-02	-6.6929E-03
6.275	7.9155E-02	1.0737E+00	2.3806E+00	6.2817E-03	1.9234E-01	6.2033E-02	-3.9428E-01	-9.6988E-02	-5.9151E-02	-6.6232E-03
6.449	7.7492E-02	1.0468E+00	2.3188E+00	6.2098E-03	1.9068E-01	6.0363E-02	-3.9303E-01	-9.2409E-02	-5.8333E-02	-6.5524E-03
6.623	7.5876E-02	1.0226E+00	2.2596E+00	6.1376E-03	1.8902E-01	5.8920E-02	-3.9167E-01	-8.8523E-02	-5.7500E-02	-6.4901E-03
6.798	7.4264E-02	9.9965E-01	2.1877E+00	6.0641E-03	1.8736E-01	5.7532E-02	-3.9013E-01	-8.4846E-02	-5.6656E-02	-6.4256E-03
6.972	7.2642E-02	9.7627E-01	2.1195E+00	5.9873E-03	1.8568E-01	5.6134E-02	-3.8846E-01	-8.1056E-02	-5.5786E-02	-6.3588E-03
7.146	7.1047E-02	9.5234E-01	2.0542E+00	5.9058E-03	1.8400E-01	5.4690E-02	-3.8676E-01	-7.7073E-02	-5.4898E-02	-6.2822E-03
7.320	6.9425E-02	9.2940E-01	1.9893E+00	5.8162E-03	1.8226E-01	5.3290E-02	-3.8517E-01	-7.3301E-02	-5.3979E-02	-6.1838E-03
7.494	6.7716E-02	9.0091E-01	1.9264E+00	5.5407E-03	1.8041E-01	5.1501E-02	-3.8377E-01	-7.1270E-02	-5.2023E-02	-5.7995E-03
7.668	5.6421E-02	8.7009E-01	1.7440E+00	4.9826E-03	1.5323E-01	4.8971E-02	-3.2858E-01	-7.0036E-02	-4.9280E-02	-4.9776E-03
7.842	5.2336E-02	8.3835E-01	1.6704E+00	4.6049E-03	1.5017E-01	4.6983E-02	-3.3597E-01	-6.7379E-02	-4.6466E-02	-4.2540E-03

APPENDIX 4

WAVE SPECTRA

The following seven Figures illustrate the wave spectra used in this study. The first two are reproduced from [15] and the rest from [2].

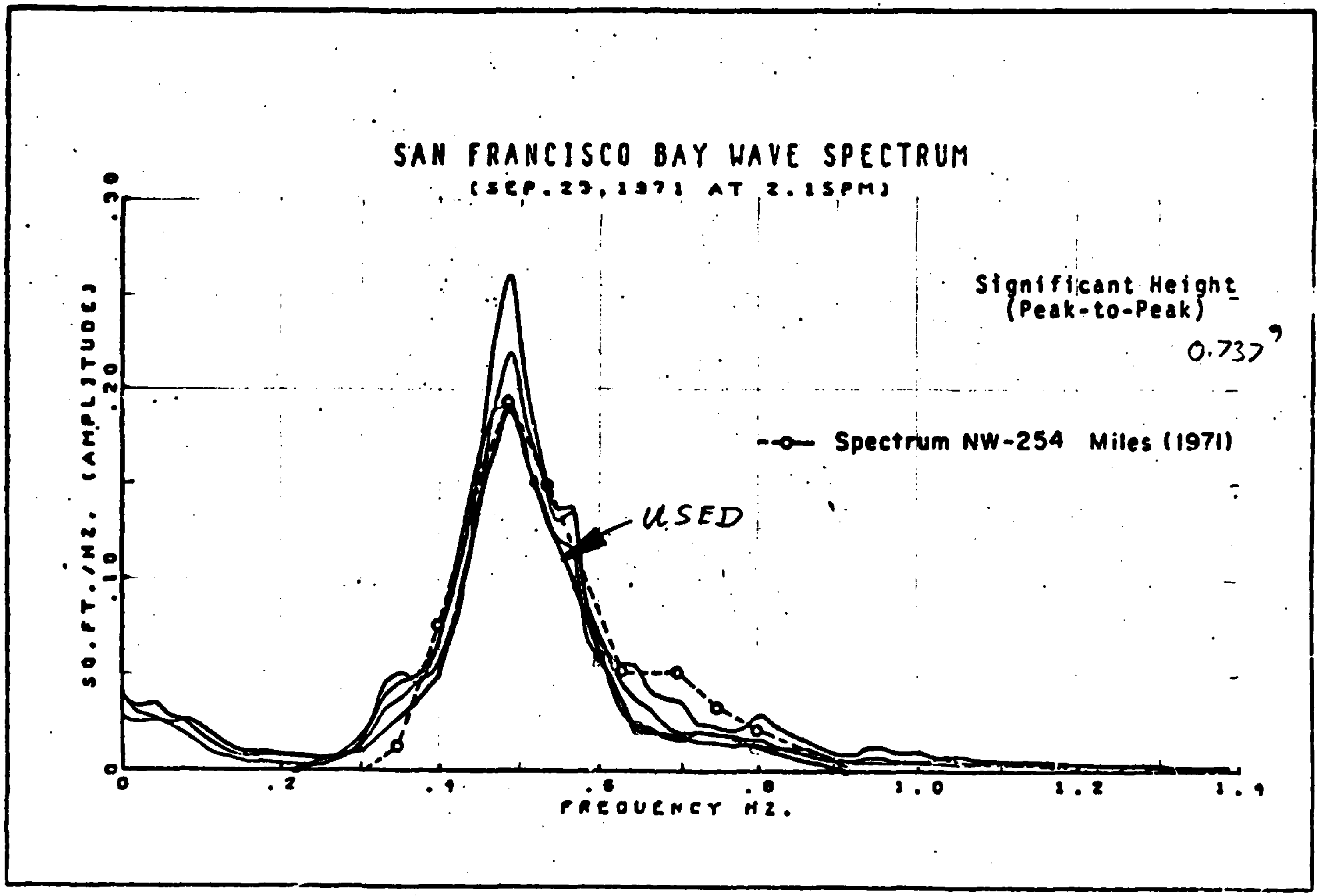

Figure 78. WAVE SPECTRUM 1

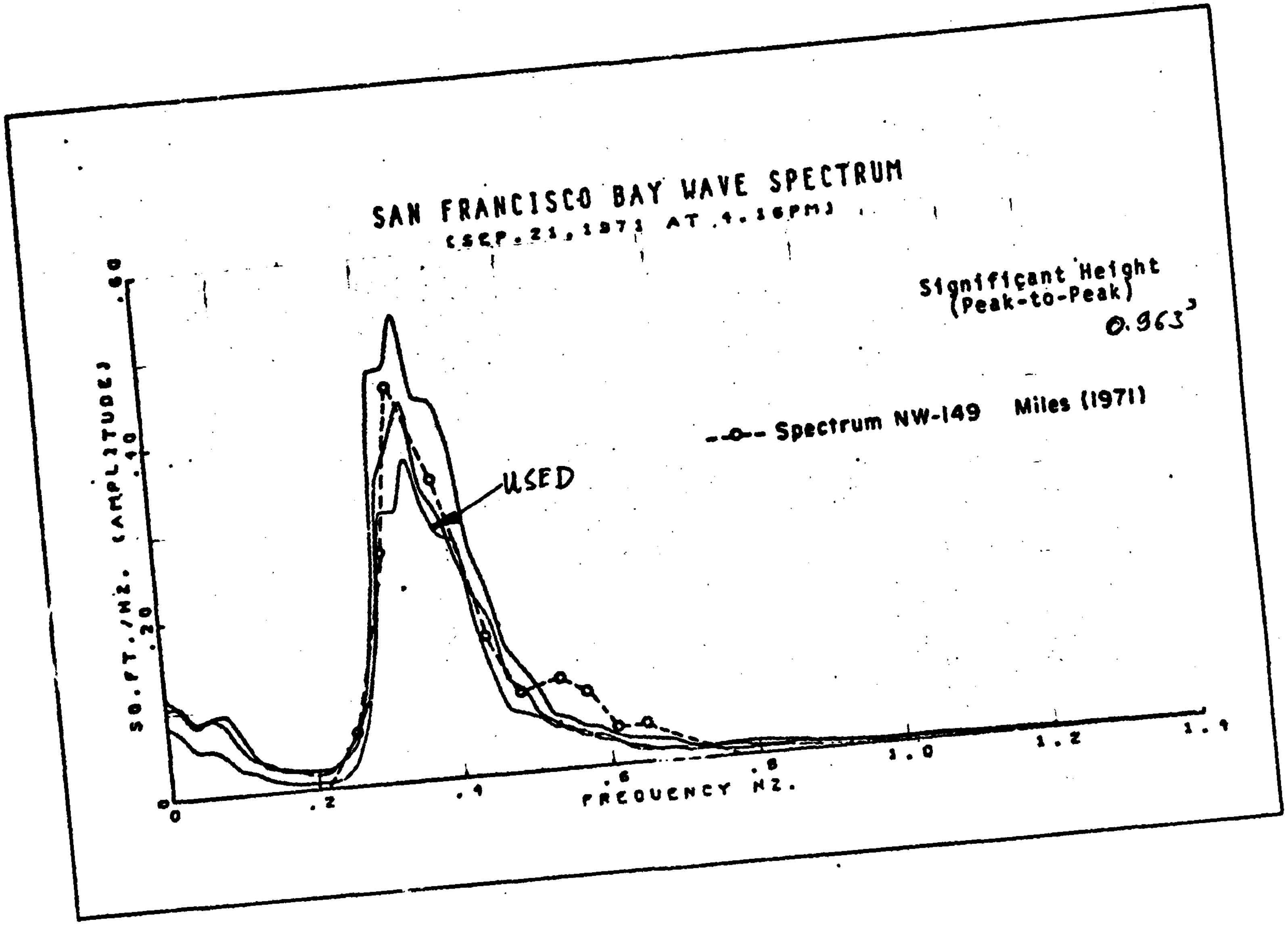

Figure 79. WAVE SPECTRUM 2

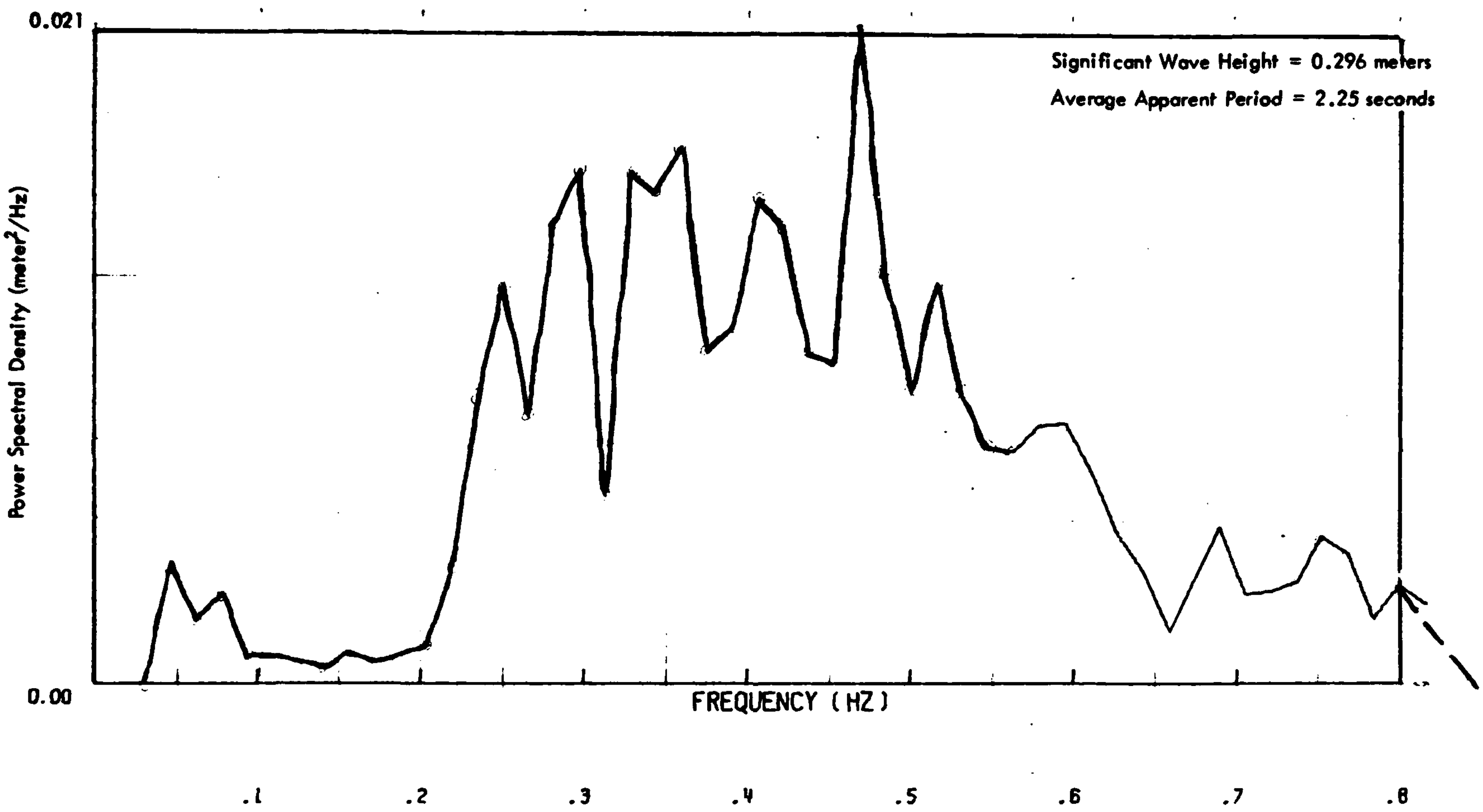

Figure 80. WAVE SPECTRUM 3

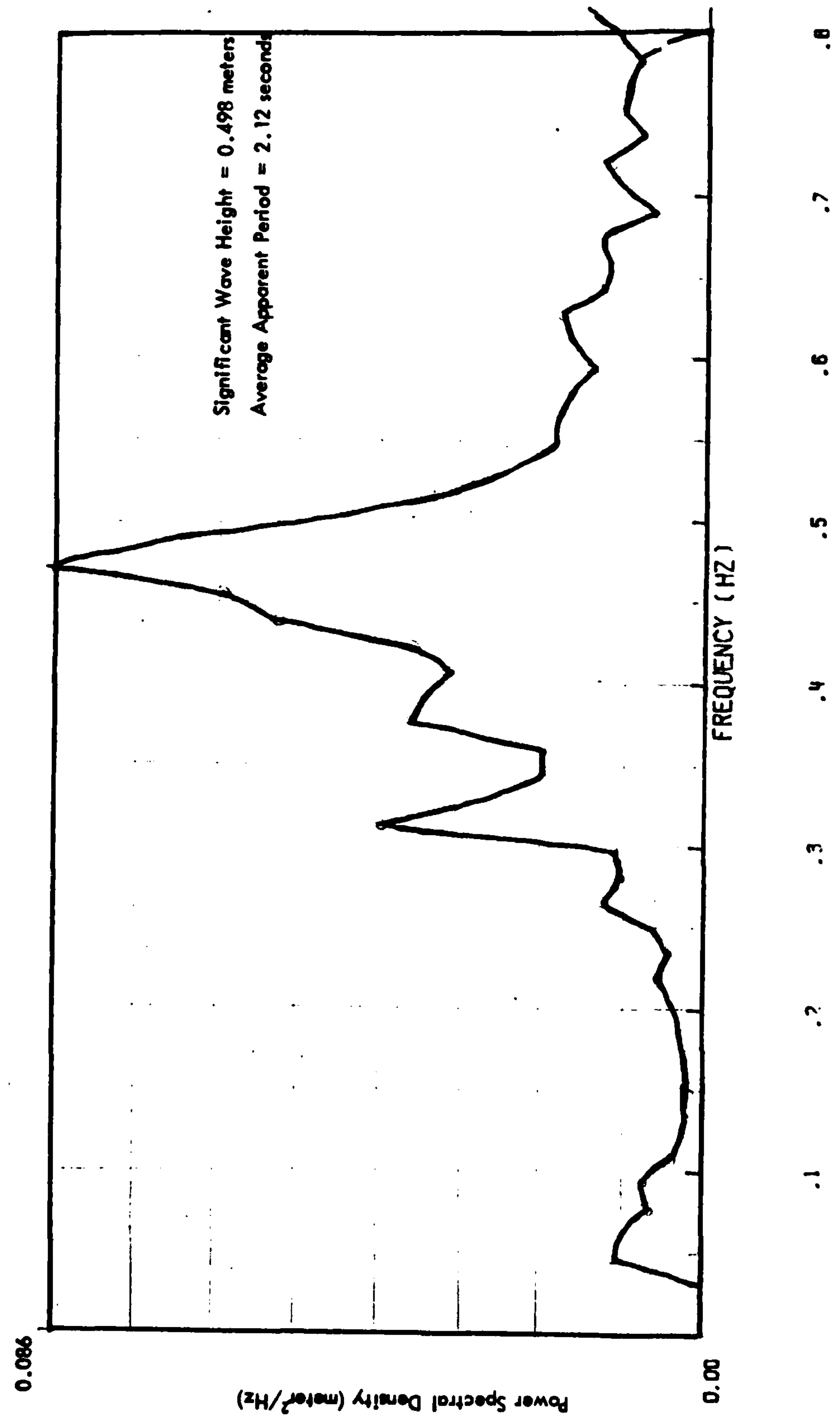

Figure 81 · WAVE SPECTRUM 4

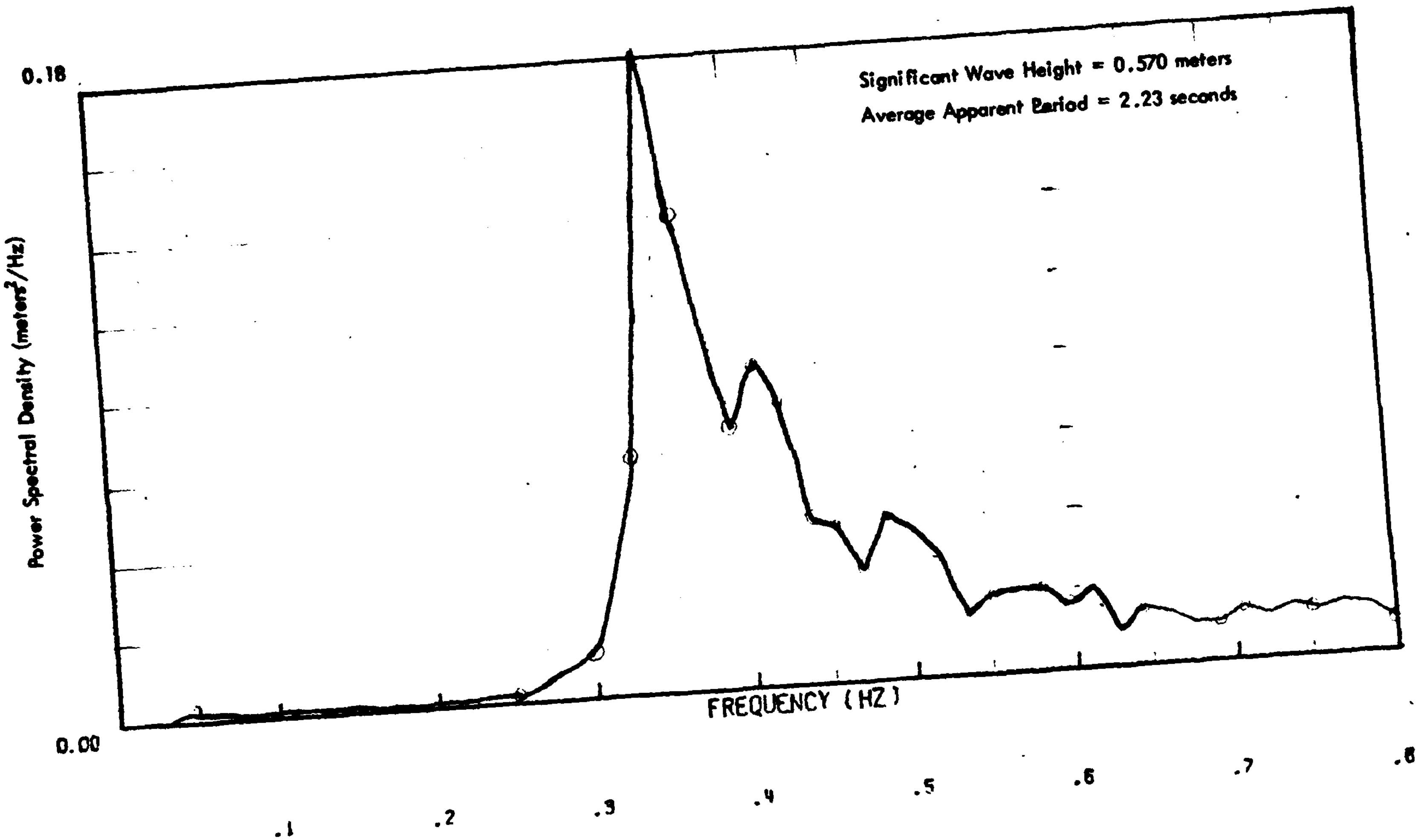

Figure 82 WAVE SPECTRUM 5

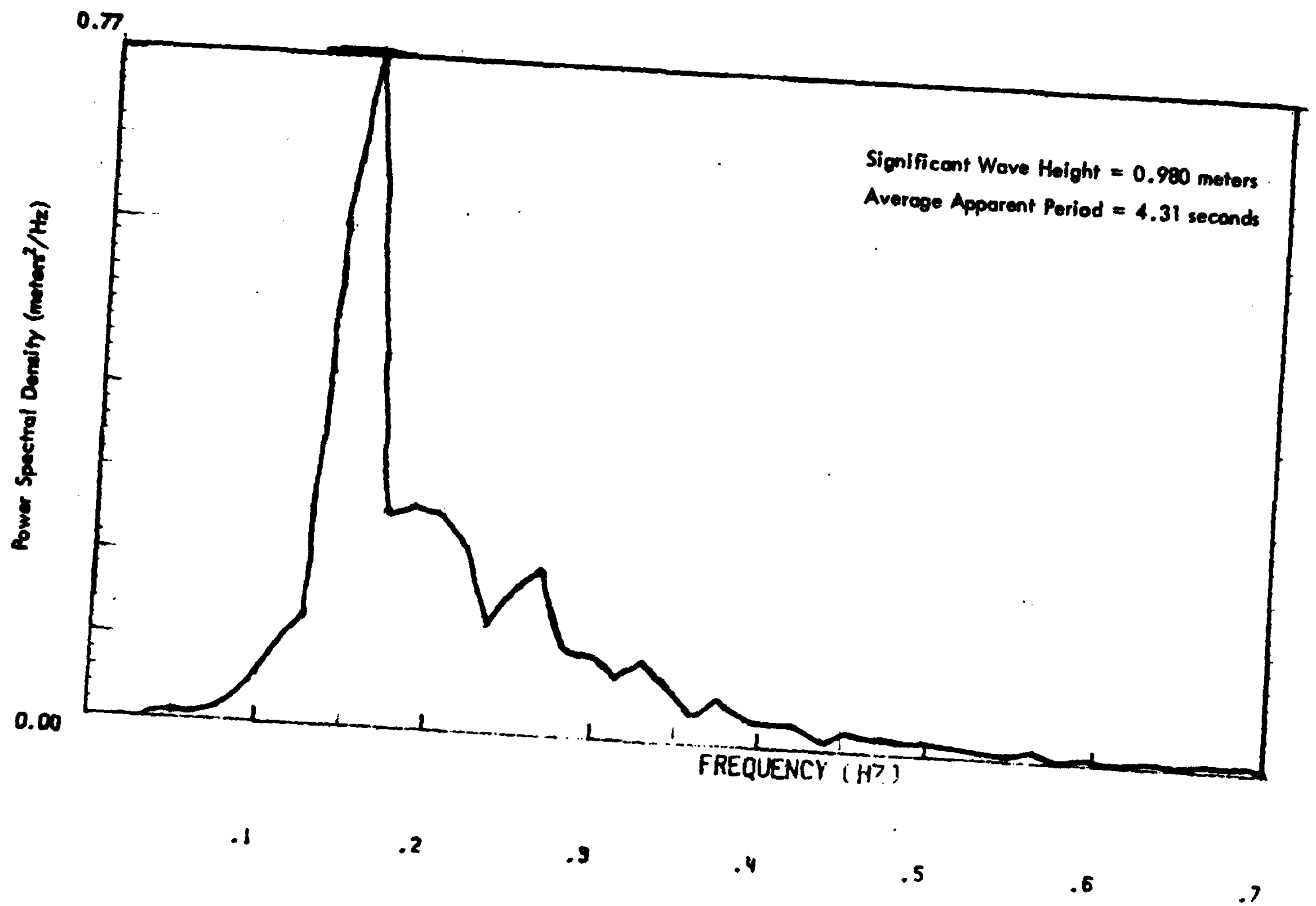

Figure 83. WAVE SPECTRUM 6

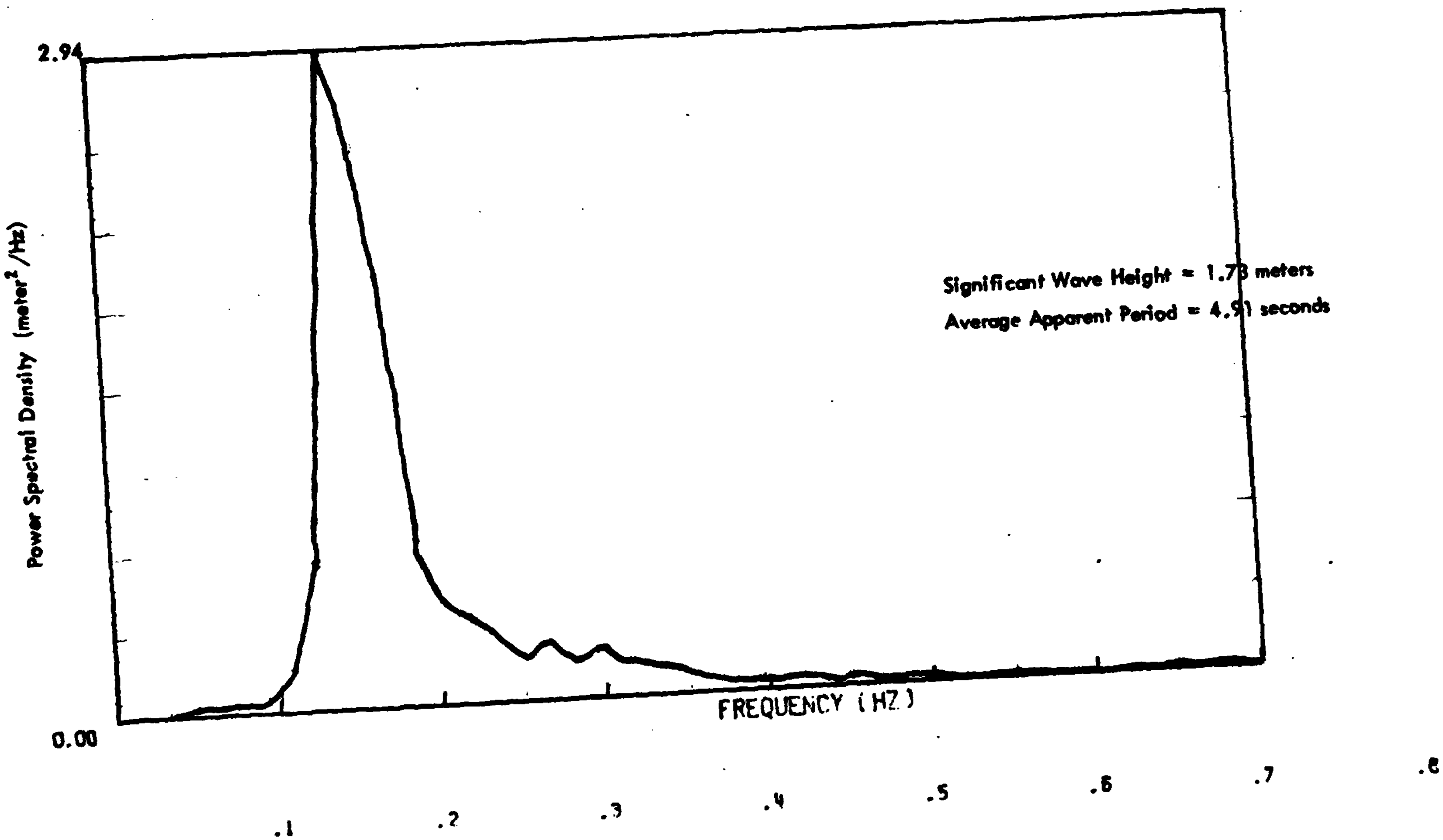

Figure 84. WAVE SPECTRUM 7

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